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September 27, 2007

Greg M. Hughes
Project Leader
Mid-Columbia River Refuge Complex
Hanford Reach National Monument
U.S. Fish and Wildlife Service
3250 Port of Benton Boulevard
Richland, WA 99354

RE: Submittal of Final Emergency Stabilization Plan, Wautoma Fire
Task Order No. 101817Y667 ~ Contract No. 101817D475

Dear Mr. Hughes,

This transmits our deliverable in accordance with Contract No. 101817D475, Order No. 101817Y667, entitled Final Emergency Stabilization Plan, Wautoma Fire, Richland dated September 27, 2007.

Items pending; FSE has not received to date (please insert):

- Part G (Heidi Newsome, USFWS to draft)

Please call me at 541-430-2812 if you have questions or Robert Krueger at (800) 447-3558.

Respectfully submitted,

Leo Sidebotham
Project Team Leader
FIRST STRIKE ENVIRONMENTAL CO

Enclosure

WAUTOMA FIRE, MID-COLUMBIA RIVER NATIONAL WILDIFE REFUGE COMPLEX, HANFORD REACH NATIONAL MONUMENT
BURNED AREA EMERGENCY RESPONSE PLAN REVIEW AND APPROVAL

I. Project Leader approval that the Burned Area Emergency Response Plan meets approved land management plan management objectives**.**

Gregory M. Hughes, Project Leader, Mid-Columbia River Refuge Complex Date

II. Regional Fire Management Coordinator concurrence that the plan fits the technical definition for use of Emergency Stabilization funding.

Regional/State Fire Management Coordinator, Region 1 Date

III. Emergency Stabilization Funding Approval (check one box below):

☐ Approved

☐ Approved with Revision (see attached)

☐ Disapproved

Regional/State Director, Region 1 Date

IV. Emergency Stabilization Funding Approval (check one box below):

☐ Approved

☐ Approved with Revision (see attached)

☐ Disapproved

National Office Date

Wautoma Fire

BURNED AREA EMERGENCY RESPONSE PLAN

UNIT: U.S. Fish and Wildlife Service**,** Mid-Columbia River National Wildlife Refuge Complex, Hanford Reach National Monument

LOCATION: *Benton County, Washington*

ORIGINAL SUBMISSION DATE: *September 27, 2007*

PREPARED BY: First Strike Environmental/Shaw BAER Team

Submitted By: _____ Date: _____
Leo Sidebotham, Team Leader

EXECUTIVE SUMMARY

Introduction

This plan has been prepared in accordance with provisions contained within Chapter 620 DM 3- Burned Area Emergency Stabilization and Rehabilitation, Presidential Proclamation 7319 of June 9, 2000 and the Hanford Reach National Monument Fire Management Plan. This plan provides burned area emergency stabilization for all lands burned within the Wautoma Fire Area perimeter and downstream impact areas including public lands administered by the U.S. Fish and Wildlife Service. Although this plan does not include emergency stabilization of lands burned in the adjacent Department of Energy (DOE) Hanford Site, these areas were similarly affected and will require the implementation of stabilization measures to reduce impacts to work/safety within the DOE Hanford Nuclear Reservation. Burned area rehabilitation recommendations are provided in the Burned Area Rehabilitation Plan. The primary objectives of the Wautoma Fire Burned Area Emergency Response (BAER) Plan are:

- To prescribe cost effective post-fire stabilization measures necessary to protect human life, property, and critical cultural and natural resources.
- To promptly stabilize and prevent further degradation to affected resources on lands within the fire perimeter and downstream impacted areas in accordance with approved land management plans and policies, and all relevant federal, state, and local laws and regulations.

Emergency Stabilization

This plan addresses the emergency stabilization needs for lands burned by the Wautoma wildfire and administered by the U.S. Fish and Wildlife Service on the Hanford Reach National Monument (HRNM). Based on information provided by HRNM staff, field assessments conducted by First Strike Environmental/Shaw Natural Resource Specialists on August 28, 2007, an evaluation was conducted to include: suppression impacts, watershed stability, archaeological recommendations, vegetation impacts, and fire effects on Federally-and State-listed threatened and endangered (T&E) species and their habitats. The vegetation specialist evaluated and assessed fire damages and suppression impacts to vegetative resources, including T&E species, and identified values at risk associated with vegetative losses. The wildlife biologist conducted an assessment of T&E species, and other species of management concern to the HRNM. Geologist and watershed specialist conducted an assessment of selected springs and associated riparian areas. A cultural resource specialist was not available at the time of the site visit. However, extensive information is available from previously published site specific documents. The cultural resource discussion and recommendations are based on these previous studies.

Individual resource Burned Area Assessment Reports produced by these specialists are in Appendix I. The cultural resource discussion and recommendations are based on previous studies. The individual treatments specifications, including the effectiveness monitoring

identified in the assessments, can be found in Part F. A summary of the activities and costs is in Part E. Appendix II contains the National Environmental Policy Act (NEPA) compliance documentation summary. Appendix III contains BAER Plan maps; Appendix IV contains the photo documentation respectively, Appendix V contains Supporting Documentation.

Fire Background

The Wautoma Fire, number 13580-9141-DW2Z, started on August 16th, 2007. It was determined that the fire was human caused and details associated with the cause of the fire are still under investigation. Hanford Fire Dispatch received the first report of the fire at 1247 hours. Hanford Fire, Battalion Chief 91 was notified of the new start at 1248 hours and the U.S. Fish and Wildlife Service was notified at 1256 hours. Battalion Chief 91 left for the fire at 1303 hours and arrived on scene at 1324 hours. The first report from Battalion Chief 91 stated that the fire was approximately 150 acres, rapidly burning eastward in grass off of State Road (Highway 240) and Wautoma Road.

This fire started in a portion of the State of Washington that has no fire district protection. These types of areas are referred to as 'no mans land'. Fires in 'no mans land' areas often have delayed or inconsistent initial attack responses. A delayed initial attack response occurred on this fire as a result of it's 'no mans land' status.

U.S. Fish and Wildlife Service, initial attack Incident Commander, Brandon Lewis, arrived on scene at approximately 1330 hours. He instantly determined that there was a threat to the Hanford Reach National Monument and began to order suppression resources to battle the blaze. The head of the fire was now only 2 miles to the west of the Monument and spreading rapidly towards it. Hanford Fire Department, Assistant Chief, Lonnie Click was on scene and assumed the Operations Chief role for Brandon Lewis. Resources were ordered to take initial attack action on the fire from U.S. Fish and Wildlife Service, Hanford Fire Department, Benton County, Adams County, Franklin County, Walla Walla County, Grant County and Yakima County. There were also two Single Engine Air Tankers and 3 large air tankers utilized. A Type III Incident Management Team from the Tri-Cities was ordered immediately.

The Type III Incident Commander, Bob Gear, of Benton County 1, arrived at 1530 hours and assumed command of the fire. The fire was now estimated at 5000 acres and was well established, parallel to Road 241 and on Yakama Ridge. The fire was spreading rapidly in the light fuels (Fuel Models 1 and 3), with rates of spread estimated at 4 miles per hour and flame lengths of 10-25 ft. Winds were in excess of 25 miles out of the west and spotting was observed at least ¼ mile ahead of the main fire. Steep terrain, sandy soils, (which limited vehicle travel), high winds, and explosive fire behavior all hampered effectiveness of the initial attack efforts on the head of the fire. Resources were able to establish anchors and flank the fire.

Bob Gear and Brandon Lewis discussed actions and determined that a Type II Incident Management Team would be needed. A Type II Incident Management Team was ordered at approximately 1600 hours as the fire crossed Road 240 onto the Department of Energy

(DOE), Hanford Reservation. To prepare for the spread of fire to the east and south and to manage the growing fire situation they established three branches. Branch One went from the origin along the entire northern perimeter and was to contain any fire on the DOE, Hanford Reservation. Branch Two was located along the foothills of the Rattlesnake and Branch Three was located along the Rattlesnake ridge top and higher ground back to the origin. Branching a fire is a very common practice and provides a structure for fire managers to organize their resources and assure proper span of control, there by, increasing effectiveness of supervision. As the fire reached and crossed Road 240, Branch One resources were utilized to line and control the fire. The fire east of Road 240 was controlled at approximately 8000 acres, 5 hours after it initially crossed Road 240.

In Branch Two the fire continued to spread south along the eastern toe of the rattlesnake range and towards the previously burned Milepost 17 Fire. When the Wautoma Fire collided with the fire scar from the Milepost 17 Fire it abruptly stopped. This provided an advantage for fire fighters to get in close to the fire perimeter. Direct and indirect methods were utilized when fire behavior allowed. Direct lines were utilized with dozers/disk being supported by engines. Indirect lines were used along HWY 240, 1200 Foot Road, and observatory roads, mainly with burn out operations and dozers/disk line.

Branch Three perimeter's ended up in many cases along the fire lines that had been constructed for the 24 Command Fire in the year 2000.

The Wautoma Fire was State Mobilized on August 16, 2007 at 1930 hours. Resources utilized during the Initial Attack, Extended Attack, and State Mobilization and then demobilized are estimated at 300 personnel in total.

The Wautoma Fire utilized:
Air Resources – 1 lead plane, 2 Single Engine Air Tankers, 3 large Air Tankers, 1 type 3 helicopter, 1 type 1 helicopter and 1 fixed wing ATGS platform.
Equipment – 16 Engines were ordered and delivered from outside of the initial response area. 43 engines were provided by the State Mobilization effort.
Crews - 4 type 2 crews
Overhead - WA IMT5, 13 Misc. Overhead, and 15 Strike Team Leaders with State Mobilization.

A close out report was prepared by WA IMT5 and is available for reference, if desired, at the Mid-Columbia River NWR Complex office. The fire was declared contained on August 18th, 2007 at 1800 hours and the State Mobilization resources were released for demobilization. WA IMT5 turned back the fire to the U.S. Fish and Wildlife Service on the morning of August 19th, 2007.

The Wautoma Fire was declared controlled on August 20th, 2007 at 1800 hours. There had been a lot of work accomplished and it had also received some rain over the entire fire area. The ES Team was tasked with the evaluation of short-term emergency stabilization of cultural and natural resource values impacted by the fire or fire suppression actions.

Fire Damages and Threats to Human Safety and Natural and Cultural Resources

The Wautoma Fire burned 72,641 acres including 51,356 acres within U.S. Fish and Wildlife Service jurisdiction on the HRNM, 10,102 acres on Department of Energy Hanford Site to the east of the Washington State Road 240, and 11,183 acres on private lands west of the Monument in Benton County, Washington. Fire suppression impacts included: 31.67 miles of disk/bulldozer that were constructed on the perimeter of the Wautoma fire, and 13.21 miles of disk/dozer line on the HRNM. The estimated damage to resources on the Monument from dozer/disk lines is 25.6 acres (based on average 16 foot width). One gate was impacted by suppression crews and backfiring operations along the HRNM boundary to prevent fire spread onto private lands to the south and west. Interior service roads that were driven extensively for suppression and mop up are now damaged and impassible due to the amount of lose powdery soils resulting from the destruction of soil structure in the upper horizons. Damage, attributed to backfiring also occurred on 475 acres of previously restored shrubs (plantings). Approximately 190,000 Wyoming big sagebrush plants were lost due to suppression actions.

The entire fire has been mapped by the U.S. Fish and Wildlife Service for burn severity. Within shrub-steppe upland habitat areas approximately 73 percent of the fire area is classified as low burn severity and 22 percent of the fire area is classified as moderate severity with less than 1 percent mapped as high burn severity. This attests to the fires' rapid spread through light fuels and low residency times within the shrubs. There were some pockets of higher burn severity where larger sagebrush plants were consumed and more dense vegetated areas along the spring riparian zones. The fuels within the upper riparian areas were completely consumed due to the available fuel. Most of the soils examined were not water repellant. Hydrophobic soil was detected in selected areas along the spring Riparian zones. Although an area wide water yield and increase in flood potential due to the fire is not anticipated, selected springs will likely experience degradation due to additional streambed scouring from the lack of vegetation and the presence of hydrophobic soil in the Riparian areas. Within selected Riparian zones, the burn severity was moderate to high due to available fuel (see maps – Appendix III).

In areas that were a shrub-steppe vegetation community prior to the fire, almost all plant and litter cover that was present in the burn area has been consumed by the fire. The loss of this vegetative cover has exposed fine sand and silty soils to ablation (wind driven erosion). Nearly all soils within the burn area – (see Wind Erosion map, Appendix III) have risk of wind erosion (please see photo documentation) with the moderate to high wind erosion risk encompassing approximately 20,000 acres. Sandy soils within the burn area are especially susceptible to wind and blowing dust poses an immanent threat to human life along state Highway 240 and working areas of Hanford (200 West, 200 East).

As a result of the 24 Command Fire in 2000, the Hanford facility to the east experienced major shut-downs due to dust in March and October 2001. In addition, Hanford workers with asthma who were sensitive to the dust were sent home. According to a Hanford spokesperson, blowing dust following the 24 Command Fire caused at least 4 shut-down episodes in the 200 West and 200 East areas. Richard Roos, a Botanist with Fluor

Hanford, indicated that there is no functional difference between the 24 Command and Wautoma Fires in terms of the dust after-affects.

The BAER Team conducted field surveys after the fire to identify impacts and compile the following recommendations for stabilization of affected lands:

Emergency Stabilization Treatments:

- Place appropriate structures to slow soil and water movement in Riparian zones and other areas to control dust.
- Stabilize soil to prevent loss or degradation of productivity by seeding to prevent establishment of invasive plants, and direct treatment of invasive plants and by using integrated pest management techniques to minimize the establishment of non-native invasive species within the burned area.
- Stabilize cultural sites by assessing significant heritage sites in those areas affected by fire and emergency stabilization including evaluating the risk of degradation to known/documented cultural resource sites.

Specifications were developed for all actions meeting the requirements for Emergency Stabilization (ES) funding:

Other resource impacts assessed as a result of the Wautoma Fire included a review of impacts to sensitive wildlife and vegetation resources.

An archeological records search needs to be conducted for sites that may be located on fire suppression lines. To conform with Section 106, further cultural resource damage assessments will be required prior to implementation of ground disturbing stabilization actions.

Federal T&E plant species listed as occurring in or having habitat within Benton County have not been entirely mapped within the fire area.

Wildlife species recorded within the fire area include 16 species of Federal or State concern, including ferruginous hawk, loggerhead shrike, and sagebrush lizard. The fire area may also be considered potential habitat for greater sage grouse (Federal candidate and State threatened) and Columbia Basin pygmy rabbit (Federal and State endangered) (see map section Appendix III – Wildlife Species of Concern and Potential Pygmy Rabbit Habitat maps).

There were no Federally listed Threatened plant species and nine previously inventoried State-listed species known to occur within the fire area. Vegetation resources provide valuable wildlife forage and habitat, watershed protection, and comprise a visually pleasing landscape. Crown tissue of perennial grasses such as bunchgrass showed a mortality rate of 10 percent in areas with low fire severity and up to 90 percent in areas with extreme burn. Vegetation resources were significantly reduced on over 90 percent of the fire area due to extremely dry conditions and high winds. Most shrub, grass and forb species and

organic material on the soil surface was consumed indicating extreme fire intensity. The primary vegetative concerns are the recovery of the shrub-steppe plant community (bunchgrass, big sagebrush and bitterbrush) and control of non-native species and noxious weed invasion. In the 7 riparian zones, the vegetative loss was approximately 75-100 percent, on an estimated 44 acres classed as riparian vegetation (a very small percent of the total fire area). The burn was virtually complete in the upland riparian areas, with only the lower Rattlesnake Spring showing unburned vegetation. Major and immediate concern for invasion of non-native species exists in this area where available water allows for plant growth year round.

The role of microbiotic crusts (MBC) in shrub-steppe ecosystems is still incompletely understood (Evans and Lih 2005:106) and estimating the magnitude and extent of MBC damage from the Wautoma Fire is a complex task that is beyond the scope of BAER field survey and assessment. Therefore, this assessment can make no definitive conclusions about the area wide condition and location of the MBC and the emergency stabilization measures recommended reflect this finding.

This BAER Plan is the initial funding request for Emergency Stabilization funds. The Emergency Stabilization funding for this plan is for one year from the date of fire containment. At the conclusion of the funding period, a final Accomplishment Report will be due to the approval authority. The Accomplishment Report will document the funding received, (initial and supplemental funding), treatments installed, the effectiveness of the installed treatments and the results of monitoring activities.

Hanford Reach National Monument Management Requirements

The uniqueness and biological diversity of the Hanford Reach was formally recognized by Presidential Proclamation 7319 of June 9, 2000 establishing this area as the Hanford Reach National Monument. The monument is described as a “biological treasure, embracing important riparian, aquatic, and upland shrub-steppe habitats that are rare or in decline in other areas. Within its mosaic of habitats, the monument supports a wealth of increasingly uncommon native plant and animal species, the size and diversity of which is unmatched in the Columbia Basin.” Because of the high diversity of native plant and animal species, the large number of rare and sensitive plant species and significant breeding populations of nearly all steppe and shrub-steppe dependent species, the U.S. Fish and Wildlife Service has been tasked to preserve and protect these objects of antiquity in perpetuity. Primary goals for the Monument through the current Draft Comprehensive Conservation Plan and Environmental Impact Statement include:

- Protect and restore the native habitats and biodiversity of the Hanford shrub-steppe ecosystem.
- Monitor, protect, and recover native plants and animals that are Federally or State-listed and any other species that are in any other way considered sensitive.
- Monitor status and trends of migratory birds, particularly those that are considered shrub-steppe obligate species and manage local populations.

- Provide for compatible education, interpretation, and wildlife-dependent recreational opportunities.
- Promote public understanding of the shrub-steppe ecosystem through scientific research and allow other compatible research opportunities afforded by the unique and isolated environment of the National Monument.
- Manage for the protection, preservation, evaluation, and understanding of the cultural heritage and resources of the ALE Reserve while consulting with appropriate Native American groups and complying with historic preservation legislation.
- Provide for operation and maintenance activities without compromising ecological and cultural values.

The following statements in the approved HRNM Fire Management Plan direct the development of the proposed burned area rehabilitation treatments funded through the Burned Area Stabilization and Rehabilitation funds:

- Emergency rehabilitation measures may be requested through the Burned Area Emergency Response (BAER). BAER plans for each fire will be reviewed by the Fire Analysis Committee. A final plan will be submitted to Region for establishing an account. Rehabilitation should be initiated prior to complete demobilization or early the following season.
- Protect and restore the native habitats and biodiversity of the Hanford shrub-steppe ecosystem (HRNM -CCP).
- Monitor, protect, and recover native plants and animals that are Federally or State-listed and any other species that are in any other way considered sensitive (HRNM-CCP).

Cumulative Impacts of Fire on the Hanford Reach National Monument

The Wautoma fire was preceded by several other large wildfires within the Monument and in the surrounding area that have caused increasing impacts to natural resources, cultural resources, and ongoing management and public use operations (Table 1). Losses of critical shrub-steppe habitat between 2000 and 2007 total 203,450 acres locally, with 116,404 acres lost within the Monument (not including the current acres burned within the Wautoma fire). Fires adjacent to Monument boundaries are especially damaging if they remove a native seed source and a potential buffer against invasive vegetation. Such fires also fragment migration corridors sensitive wildlife can use to access protective Monument lands.

Table 1:

Fire Name	**Year**	**Cause**	**Total acres burned**	**USFWS acres burned (Monument)**
24 Command	2000	Human Caused - Auto Accident	163,884	78,732
Vernita Flat	2000	Lightning	119	119

White Bluffs	2002	Lightning	285	285
Shooting Range	2003	Human Caused - Firearms discharge	1391	507
Fuji	2004	Lightning	36	36
Weather Station	2005	Human Caused - suspected fireworks, unknown	4918	4840
McLane	2005	Human Caused - Agricultural burning	6850	6068
Saddle Mountain Lakes	2006	Lightning	26	26
Overlook	2007	Lightning	**21233**	**21083**
Milepost 17	2007	Human Caused- Suspected auto accident	**4708**	**4708**
TOTAL			**203,450**	**116,404**

Burned Area Emergency Response (BAER) Plans have been implemented on several previously burned areas within the Monument. However, given the long time frames required for the regeneration of shrub-steppe vegetation, several of these previously burned areas are still considered to be recovering because they have not had sufficient time to re-establish what could be considered functional wildlife habitat. The repeated burn of this area including the Wautoma Fire has added to the cumulative loss of habitat within the Monument boundary. It was observed that over 90 percent of the Wautoma Fire area showed a mortality rate between 90-100 percent of all vegetation and standing biomass resulting in continued impacts to native grasses and shrubs and overall wildlife habitat. Applying herbicide and planting of native seeds will be necessary to protect this shrub-steppe community from further invasion of noxious and invasive weeds. Application of herbicide and planting of native seeds (including aerial seeding) to restore areas before invasive species become established is well supported by recent research (Bakker & Wilson, 2004:1058-1064) (Huddleston & Young 2005:507-515) (Thompson & Rounding, 2006) (Seabloom & Harpole 2003).

The increasing frequency and intensity of range fires, introduction of a variety of non-native and invasive species and the change in climate throughout the Columbia and Great basins pose a critical threat to native grasses and shrubs and overall wildlife habitat in the shrub-steppe. Historically, fires in the shrub-steppe were less frequent and likely less intense and smaller, resulting in a complex mosaic of habitat over the landscape. With these changes in fire patterns, native shrubs are killed, seed reservoirs of grasses and shrubs are depleted

and habitat is replaced with exotic annuals such as cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola kali*), or aggressive noxious weeds such as yellow starthistle (*Centaurea solstitialis*). Natural shrub regeneration is limited by incremental reestablishment from the existing shrub edge, a slow process exacerbated by current fire patterns and competition from non-native plant species.

Throughout shrub-steppe habitat in Washington, fire has continued to eliminate shrub-dominated sites at a rate faster than natural regeneration (or re-vegetation efforts) can restore. The regional negative impact of shrinking high quality habitat cannot be overstated. Additionally, while large landscape-sized fires also continue to occur on nearby habitat such as on the Yakama Indian Reservation the Yakima Training Center, their overall higher elevation, topographic variability and resiliency contrast with the middle and lower elevations of the Pasco Basin and the Monument, which are dominated by sand and gravel of the cataclysmic Missoula Floods. The unique geomorphic features of the Pasco Basin generally support a less resilient but highly diverse assemblage of plant communities and associated wildlife habitat.

Effectiveness of Emergency Stabilization and Rehabilitation on the Hanford Reach National Monument

Emergency stabilization treatments have proven to be effective on the Hanford Reach National Monument. Treatments have met general Monument objectives (*see BAER final accomplishment report for 24 Command Fire(2003*) and have attempted to provide for soil stabilization, prevent ecological degradation and reduce the fire risk across the landscape. For example, the following Emergency Stabilization and Rehabilitation measures were implemented for the 163,884 acre 24 Command fire.

- Treatment of 10,300 acres impacted by non-native invasive species;
- Stabilization of 1,713 acres of shrub steppe with shrub plantings;
- Stabilization of 9,840 acres of shrub steppe with native grass seed;
- Stabilization of 1,000 acres of shrub steppe by drill seeding of native species;
- Rehabilitation of 1.5 miles of dozerlines and handlines.

For example, when the Wautoma Fire footprint is overlaid on the 24 Command fire footprint, it appears that the Wautoma fire spread (approximately) into the previously treated fire footprint (See Wautoma Command, Milepost 17 and 24 Command Fires Burned Areas Maps - Appendix III). The Wautoma fire was contained at a much smaller acreage than the 24 Command fire due to the stabilization and rehabilitation treatments described above. Issues related to the stabilization and rehabilitation post 24 Command Fire that may have allowed for even greater reduction of fire spread, and improved the success of the post fire treatment measures conducted include:

- Immediate/timely implementation of emergency stabilization measures;
- Spraying larger burn areas to reduce invasive grasses
- Stabilizing riparian habitat to hinder the spread of fire.

With sufficient and timely ES measures, re-vegetation efforts combined with invasive species treatments have attempted to reduce fire risk and to stabilize the previously burned areas.

Treatment of the Wautoma fire area will be critical not only to reduce erosion and dust potential and to prevent site degradation but to reduce fire risk and create a more natural fire regime over time across the Monument area.

Evans and Lih (2005) findings/conclusions support the recommended Wautoma Fire ES measures over natural recovery:

- Careful management… and a long term commitment to integrated and adaptive approaches to invasive species management, fire management and restoration practives will be required to successfully manage the ALE Reserve and other shrub-steppe ecosystmes in the coming years.
- Aggressive management activity to control cheatgrass and to enhance the recovery of natural structure and function of sagebrush shrubland stands will be critical to the long-term ecological integrity of these habitats.
- The problem of cheatgrass must be addressed in relation to native plant community health and fire management practices. There are no simple answers; no permanent solution to the problem of cheatgrass control is currently available and management is extremely challenging.
- The rates of grass seedling emergence and recruitment from aerial seeding efforts observed in the study are probably typical of broadcast seeding efforts in the arid West. (*This infers that aerial seeding is a typical broadcast seeding practice in similar areas of the Western U.S.*).

TABLE OF CONTENTS

PART A - FIRE LOCATION AND BACKGROUND INFORMATION

Fire Name	Wautoma Fire
Fire Number	13580-9141-DW2Z
Agency Unit	U.S. Fish and Wildlife Service**,** Mid-Columbia River National Wildlife Refuge Complex, Hanford Reach National Monument
Region	USFWS Region 1
State	Washington
County(s)	Benton
Ignition Date/Cause	August 16, 2007, Human
Zone	Pacific Northwest
Date Fully Contained	August 18, 2007
Jurisdiction	Acres
Mid-Columbia River National Wildlife Refuge Complex, Hanford Reach National Monument	51,356
Department of Energy, Hanford Site	10,102
Private land	11,183
Total Acres	72,641
Date Contained	August 18, 2007

PART B - NATURE OF PLAN

Type of Action (check one box below)

X	Initial Submission
	Amendment to the Initial Submission

PART C - EMERGENCY STABILIZATION ASSESSMENT

Emergency Stabilization Objectives

- *To prescribe cost effective post-fire stabilization measures necessary to protect human life, property, and critical cultural and natural resources.*

- *To promptly stabilize and prevent further degradation to affected resources on lands within the fire perimeter and downstream impacted areas in accordance with approved land management plans and policies, and all relevant federal, state, and local laws and regulations.*

PART D - TEAM ORGANIZATION, MEMBERS, AND RESOURCE ADVISORS

I. Burned Area Emergency Response Team Members: *(List of technical specialists used to develop the plan)*

Position	Team Member (Agency)
Team Leader	Leo Sidebotham (FSE)
Operations	Heidi Newsome, USFWS
Environmental Compliance & Planning	Robert Krueger (FSE) / Wes Harper (FSE)
NEPA Advisor	Tony Roth (FSE/Shaw)
Hydrologist/Geologist	Craig Fanshier (FSE/Shaw)
Watershed Scientist	Wayne Coppel (FSE/Shaw)
Soil Scientist	Todd Martin (FSE/Shaw)
Cultural Resources/Archeologist	Science Kilner (FSE/Shaw)
Vegetation Specialist	Rebecca Meyers (FSE/Shaw)
Wildlife Biologist	Bruce Kvam (FSE/Shaw)
GIS Specialist	Lindsey Hayes (USFWS), Kevin Goldie (USFWS)
Documentation/Computer Specialist	Michele Kruger (FSE)/Lori Lane (FSE)/Lori Onate (FSE)
Photographer	Wes Harper (FSE), Craig Fanshier (FSE/Shaw), Kevin Goldie (USFWS)

III. Resource Advisors: (Note: Resource Advisors are individuals who assisted the burned area emergency response team with the preparation of the plan. See Part H for a full list of agencies and individuals who were consulted or otherwise contributed to the development of the plan.

Name	Affiliation
Gregory M. Hughes	Project Leader, Mid-Columbia River National Wildlife Refuge Complex
Heidi Newsome	U.S. Fish and Wildlife Service/Wildlife Biologist
Kevin Goldie	U.S. Fish and Wildlife Service/Biologist
Howard Browers	U.S. Fish and Wildlife Service/Biologist
Chris Schulte	U.S. Fish and Wildlife Service, Fire Management Officer
Brandon Lewis	U.S. Fish and Wildlife Service, Supervisory Range Technician
Tony Roth	FSE/Shaw, Senior Review (Wildlife, Vegetation)
Erika Britney	FSE/Shaw, Senior Review (Wildlife, Vegetation)
Debra Carey	FSE/Shaw, Senior Review (Hydrology, Geology)

PART E - SUMMARY OF ACTIVITIES AND COSTS

The summary of activities and cost table below identifies emergency stabilization costs charged or proposed for funding from subactivity 9142 funding sources.

EMERGENCY STABILIZATION ACTIVITIES COST SUMMARY TABLE - Wautoma Fire

Spec #	Title	Unit	Unit Cost	# of Units	Work Agent	Cost
1	Conduct cultural resource assessment to determine whether known historic properties may be at risk of further degradation	Sites	388.90	123	FA	$47,838.60
2	Non-native invasive species control-Integrated Pest Management	Acres	26.10	22,763	SC	$593,097.00
3	Ecological Stabilization- Native Seeding	Acres	368.10	23,649	SC	$8,704,453.00
4	Emergency Stabilization Plan Development	Each	90,000.00	1	FA	$90,000.00
5	Stream Channel Stabilization/Rock Dams	Miles	33,922.00	4	FA	$135,690.00
6	Stream Channel Stabilization /Log Dams	Miles	51,026.00	1.7	FA	$86,745.00
7	Protective Fence/Elk	Miles	64,906.00	3.5	FA	$227,171.00
8	Drift/Silt Fencing	Rolls	141.02	975	FA	$137,495.00
9	Erosion Control Jute Mating/Dust Control	Miles	51,036.00	9	FA	$459,330.00
10	Native Seeding ATV/Floodplain Areas	Acres	2,136.00	50	FA	$106,815.00
TOTAL COST						$10,588,634.00

Work Agent: CA=Coop Agreement, FA=Force Account, G=Grantee, P=Permitee, SC=Service Contract, TSP=Timber Sales Purchaser, V=Volunteer

PART F - INDIVIDUAL SPECIFICATIONS

TREATMENT/ACTIVITY NAME	Perform a data evaluation and field inspection of cultural resource to determine whether known cultural resources including but not limited to known and unknown historic and prehistoric properties have been or are at risk of being degraded as a result of the Wautoma Fire.	**PART E SPECIFICATION #**	1
NFPORS TREATMENT CATEGORY*	Heritage Resources	**FISCAL YEAR(S) (list each year):**	2008
NFPORS TREATMENT TYPE *	Protect Heritage Sites	**WUI? Y / N**	N
IMPACTED COMMUNITIES AT RISK	None	**IMPACTED T&E SPECIES**	None

* See Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

I. WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Assess whether known historic properties were degraded within the area burned by the Wautoma Fire including documenting potential areas of concern. Once identified, recommending appropriate measures to prevent and/or mitigate degradation at each location.

B. Location/(Suitable) Sites: Cultural Resources within burned areas and/or areas where suppression activities occurred were previously located during the Command 24 Fire in 2000 (approximately 190 sites). For budgeting purposes, the number of sites to be addressed in this study is 123 based on the number of sites identified in the 24 Command Fire multiplied by the fractional burn area of the Wautoma Fire versus the 24 Command Fire.

C. Design/Construction Specifications:

1. Perform data evaluation of previously identified sites in the Wautoma Burn and suppression areas. Develop field reconnaissance methodology for each location/site of potential concern.

2. Relocate previously recorded cultural resources within the burned area by conducting site reconnaissance. Identify potential conditions that could threaten sites. Site reconnaissance should include identification of potential degradation from environmental exposure; such as wind deflation, undercutting and loss of integrity, as well as wind-aided burial or erosion of surface features, increased visibility and vulnerability to looting. This task includes field surveying areas where anticipated ES measures will be implemented (e.g. drill-seed areas, riparian zone stabilization, dust-suppression areas)

3. Develop mitigation, rehabilitation or monitoring recommendations, measures and cost estimates for each site that may be threatened by burial, destabilization, exposure to the public, or erosion consequent to fire/suppression effects.

4. Initiate consultation with Tribal governments, Native American Indian communities and SHPO as required under 36 CFR 800.

D. Purpose of Treatment Specification: This action is necessary to meet legislative mandates under Section 106 of the National Historic Preservation Act and 36 CFR 800.

II. LABOR, MATERIALS AND OTHER COST:

➢ **PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).**	**COST / ITEM**
Principal Investigator and Project Manager 240 hours @ $80/hour	19,200.00
Crew Chief 240 hours @ $50/hour	12,000.00
Crew 240 hours @ $28/hour	6,720.00
FWS Tribal consultation/interviews $400/day for 10 days	4,000.00
TOTAL PERSONNEL SERVICE COST	41,920.00

➢ **EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):**	**COST / ITEM**

Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	

➢ MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL MATERIALS AND SUPPLY COST	

A. ➢ TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
(2) each 4 X 4 Pickup @ .485/mile x 100 miles/day x 24 days x 1 FY's –Field visits	2,328.00
2 – Round Trip travel from Regional Cultural Resources Office in Sherwood Oregon : 490 Miles @ .485/mile X 4 trips	950.60
Per diem Lodging and meals, Richland Washington 24 days (lodging $60/day and Meals & incidentals $50/day)	2,640.00
TOTAL TRAVEL COST	5,918.60

➢ CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY08	10/01/2007	7/23/2008	S	Site	$388.90	123	47,838.60
						TOTAL	47,838.60

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	**Estimate obtained from 2-3 independent contractual sources.**	
2.	**Documented cost figures from similar project work obtained from local agency sources.**	P
3.	**Estimate supported by cost guides from independent sources or other federal agencies**	
4.	**Estimates based upon government wage rates and material cost.**	
5.	**No cost estimate required - cost charged to Fire Suppression Account**	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Cultural Resource Burned Area Assessment.

IV. TOTAL COST BY JURSIDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Mid-Columbia River Refuge Complex, Hanford Reach National Monument	123	**47,838.60**
	TOTAL COST	**47,838.60**

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	**Non-native invasive species control-Integrated Pest Management**	**PART E SPECIFICATION #**	2
NFPORS TREATMENT CATEGORY*	Invasive Species	**FISCAL YEAR(S) (list each year):**	2007, 2008
NFPORS TREATMENT TYPE *	Chemical/Biological/Mechanical	**WUI? Y / N**	N
IMPACTED COMMUNITIES AT RISK	Sagebrush steppe, Riparian	**IMPACTED T&E SPECIES**	Sage Sparrow, Townsend's Ground Squirrel, Ferruginous Hawk, White-Tailed Jack Rabbit, Greater Sage Grouse, Long-Eared Myotis, Townsend's Big-Eared Bat, Mule Deer

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: The specification will stabilize soil to prevent loss or degradation of productivity by seeding to prevent establishment of invasive plants; and direct treatment of invasive plants by using integrated pest management techniques to minimize the establishment of non-native invasive species within the burned area. Minimize the noxious weed infestations remaining and control new infestations within Wautoma Fire area (See Appendix III, Maps, #24) prior to seed-set and maturation. Current weed species observed include Rush skeleton weed (*Chondrilla juncea*), Russian knapweed (*Acroptilon repens*), Perennial pepperweed (*Lepidium latifolium*), diffuse knapweed (*Centaurea diffusa*), puncturevine (*Tribulus terrestris*), swainsonpea (*Sphaerophysa salsula*), Canada thistle (*Cirsium arvense*), kochia (*Bassia scoparia*). Utilize integrated pest management techniques (herbicides mechanical and cultural control methods) as appropriate to prevent the spread and establishment of noxious weeds within the fire area. Control Cheatgrass (*Bromus tectorum*) that germinates in fall of 2007 and spring of 2008 to reduce competition with native species recovery and reseeding efforts.

B. Location/(Suitable) Sites: Control all visible noxious weed populations along roads, trails and disturbed sites within the fire area. Control sites identified include dozerlines, disklines. Control non-native invasive species, such as Cheatgrass, within the fire perimeter to decrease competition for native grass seeded species.

C. Design/Construction Specifications:

1. Control known populations of noxious weeds as identified in USFWS reviews (see Maps Appendix III) prior to seed set.
2. Recommended herbicide for cheatgrass control is Journey® (imazapic/glyphosate) or Plateau® (imazapic). Application at low concentrations (2-4 oz Plateau/acre, 6-11 oz Journey/acre) during late winter-early spring will minimize damage to native species. This treatment combination will evaluate which treatment works most effectively to reduce cheat grass. Adjuvants (e.g., surfactant, drift control agents, de-foaming agents) will be required for all weed treatments.
3. Roadside and small infestations will be treated by backpack spraying or truck/ATV mounted sprayer. Non-native invasive species control within interior of fire area will be treated using fixed-wing or rotary aircraft services.
4. Winds in the area to be sprayed should be less than 10 MPH (constant).
5. A buffer of 150 feet will be adhered to around all private land areas. Herbicides approved for aquatic use will be used in riparian wetland areas according to labeled specifications.
6. Applicator will be state certified. All aircraft used should be OAS certified; will be equipped with GPS guidance systems and contractor will be licensed and bonded.
7. Locate, map, and document (using photography, topographic maps, and Global Positioning System--GPS—technology), new weed occurrences within burned area. Provide GPS shapefile to aerial contractors for use in GPS guided applications. Document percent control or kill of noxious weeds.

D. Purpose of Treatment Specifications: Protect the ecological integrity and site productivity of shrub-steppe plant communities and riparian areas within the Hanford Reach National Monument in accordance with established management plan guidelines.

E. Treatment Effectiveness Monitoring Proposed: Spot checking of noxious weed sites to ensure control methods are meeting management objectives. A staff person from the Mid-Columbia River NWR Complex will visit sites controlled every week after initial treatment; this is especially important for weed populations that are sprayed to ensure effectiveness of herbicide application. If both spring and summer/fall applications are used then visits will occur during both these times. Also see Specification for Effectiveness monitoring of treatments.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
Maintenance Workers (3) each @ $30/hour x 60-hours per treatment x (6) treatment periods x 1-year	32,400.00
Wildlife Biologist (GS-12) @ $39/hour x 63 hours per treatment x 6 treatment periods x 1 year	14,742.00
TOTAL PERSONNEL SERVICE COST	47,742.00

EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
Misc. Spray nozzles, hoses, backpack sprayer, equipment repair	1,500.00

TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	1,500.00
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Plateau – 409-gal (4 fl oz/acre X 13,090 acres) @ $277.00/gal	113,293.00
Journey – 832-gal (11 fl oz/acre X 9,673 acres) @ $108.00/gal	89,856.00
TOTAL MATERIALS AND SUPPLY COST	203,149.00
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
4 x 4 Pickup @ 0.485/mile X 120 miles/day X 27 days X 1 FY	1,310.00
TOTAL TRAVEL COST	1,310.00
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Aerial Application of Herbicide 15,522 Acres x $18/ac.	279,396.00
Inventory and monitoring. Contract, (3) each scientists @ $50/hour x 5-weeks spring (200 hours) and 5-weeks fall (200 hours) = $60,000 per year X 1FY	60,000.00
TOTAL CONTRACT COST	339,396.00

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY08	10/01/2007	7/23/2008	S	acres	26.10	22,763	593,097.00
						TOTAL	593,097.00

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	M
2.	Documented cost figures from similar project work obtained from local agency sources.	C, E
3.	Estimate supported by cost guides from independent sources or other federal agencies	M
4.	Estimates based upon government wage rates and material cost.	M, P, T
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Vegetation and Soils Resource Damage Assessment, Wildlife Damage Assessment, and Appendix III – Maps.

TOTAL COST BY JURSIDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Mid-Columbia River National Wildlife Refuge Complex, Hanford Reach National Monument	22,763.00	593,097.00
	TOTAL COST	**593,097.00**

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	**Ecological Stabilization- Native Seeding**	**PART E SPECIFICATION #**	3
NFPORS TREATMENT CATEGORY*	Invasive Species & Wildlife Habitat	**FISCAL YEAR(S) (list each year):**	2008
NFPORS TREATMENT TYPE *	Preventative Seeding	**WUI? Y / N**	N
IMPACTED COMMUNITIES AT RISK	Sagebrush steppe	**IMPACTED T&E SPECIES**	Sage Sparrow, Townsend's Ground Squirrel, Ferruginous Hawk, White-Tailed Jack Rabbit, Greater Sage Grouse

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: The specification will stabilize soil to prevent loss or degradation of productivity by seeding to prevent establishment of invasive plants within the burned area. Apply native seed mix through aerial broadcast, and drill seeding application in burned area to prevent the establishment of noxious weeds and invasive non-native species; and to limit erosion and stabilize soils.

B. Location/(Suitable) Sites: The Wautoma Fire area on Monument lands (51,356 acres) is located on the west side of SR 240 of the Hanfdord Reach National Monument (see Appendix III, Maps, #1). Reseeding should take place across the portions of the fire area; Seed mix #2: 13,420-acres aerial/seed mix, 1,272-acres drill seed mix with an additional 2,200-acres drill seed mix along Highway 240, per Watershed and Soil Assessment recommendation, dust control #8; Seed Mix #1: 727-acres aerial seed mix. 4,655 drill seed mix; Seed mix #3: Riparian area 50-acres seed mix plus Great Basin Wild Ryegrass seed that were critical shrub-steppe habitat areas to stabilize soils, limit weed invasion, and promote ecological integrity. (See Appendix III, Maps, #16) Riparian areas will be seeded using native seed mix with Great Basin Wild Rye seed added around the edges.

1. Purchase native seed mix: in appropriate amounts to stabilize soils and ecological function according to the following specifications for native seed mix.

Mix 1 : Sandy soils areas: 727-acres aerial application, with 4,655-acres drill seed application

Grasses	
Indian Ricegrass (*Oryzopsis hymenoides*) (Nez Par)	3 lbs./ac. PLS
Needle and thread grass (*Stipa comata*)	0.2 lbs/acre
Sandberg's bluegrass (*Poa sandbergii*) (Hanford)	2 lbs./ac. PLS
Sand dropseed *(Sporobolous cryptandrus)*	0.2 lb. /ac PLS
Bottlebrush Squirreltail (*Elymus elymoides*)	1.5 lbs./ac PLS
Thickspike Wheatgrass (Swindemar) *(Elymus lanceolatus)*	4 lbs./ac PLS
Forbs	
Yarrow, (*Achillea millefolium*)	0.2 lbs./ac PLS
Columbia Blue Flax (*Linum* sp.)	0.2 lbs./ac PLS

Mix 2 : Loamy (less sandy) acres: 13,420-acres aerial application, with 1,272-acres drill seed application
This mix will be drill seeded with the Great Basin wild ryegrass in riparian areas 815-acres)

Grasses	
Indian Ricegrass (*Oryzopsis hymenoides*) (Nez Par)	3 lbs./ac. PLS
Needle and thread grass (*Stipa comata*)	0.2 lbs/acre
Sandberg's bluegrass (*Poa sandbergii*) (Hanford)	2 lbs./ac. PLS
Sand dropseed *(Sporobolous cryptandrus)*	0.2 lb. /ac PLS
Bottlebrush Squirreltail (*Elymus elymoides*)	1.5 lbs./ac PLS
Bluebunch Wheatgrass (*Pseudoroegneria spicata)*	4 lbs./ac PLS
Forbs	
Yarrow, (*Achillea millefolium*)	0.2 lbs./ac PLS
Columbia Blue Flax (*Linum* sp.)	0.2 lbs./ac PLS
Shrubs	
Wyoming Big Sagebrush (*Artemisia tridentate* ssp. *wyomingensis*)	0.1 lbs/ac PLS
Winterfat (*Krascheninnikovia lanata*)	0.1 lbs/ac PLS
Antelope bitterbrush (*Purshia tridentata*)	0.1 lbs/ac PLS

Mix 3: Riparian acres , est. 50-acres

Seed Mix 2 plus: Great Basin Wild Ryegrass seed (*Elymus cinereus*)	4 lbs/acre PLS

2. Seed Mixture Selection and Certification: The seed mix should be tested for purity and germination rates. Before accepting delivery of seed shipment the contractor must provide written evidence (seed label and letter) to the Monument managers (Deputy Project Leader or Natural Resources Specialist) that the seed conforms to the purity and germination requirements in the specification. Seed must also be source identified as to its origin. Columbia Basin derived and grown seed is required, where practical, for all native grass, forb and sagebrush species.

3. Delivery: Deliver certified weed-free seed sold on pure live seed basis. Deliver to Hanford Reach National Monument.
Storage: Seed should be applied as soon as possible after delivery. If immediate application is not possible the seed should be stored under dry, cool conditions and protected from rodents and other wildlife. Seed also needs to be protected from dew and rain.

4. Timing of Seeding Application: Seeding should occur in December, 2007, or no later than late January, 2008.
Application Rate: Seed will be applied at the above rates, on a PLS/acre basis.

5. Application Method: Seed will be applied by aerial contract services for broadcast seed operations. Broadcast seeding will be conducted by fixed-wing aircraft. Aircraft should be OAS certified; will contain GPS guided navigational systems for accurate seed placement to coordinates provided by the USFWS; contractor must be bonded.
Hydromulch Applications- 1,375-acres will be hydromulched to stabilize highly erosive soils. (See Appendix III, Maps, #16) Mulch specifications are to include mulch delivered at a rate of 1,000 lbs./ acre containing 40%paper and 60% wood fiber. Mulch will contain a binder containing Supertack at a rate of 80 lbs./ac. Mulch will contain seed provided by USFWS and applied at the rate specified in above mix on a PLS pounds to the acre basis. Mulching operations will require GPS guided application from fixed-wing aircraft and will require same stipulations as described in Aerial seeding treatment.
Drill Seeding- Approximately 5,927- acres of the Wautoma fire will be seeded with a rangeland drill on silt loam and sand soils on the southeastern and southwestern and northeastern portions of the fire. Drill seeding operations will be conducted at ½ the aerial application rate.

D. Purpose of Treatment Specifications:

- Actions to stabilize soil to prevent loss or degradation of productivity.
- Seeding to prevent establishment of invasive plants, and direct treatment of invasive plants.

E. Treatment Effectiveness Monitoring Proposed: Monitor to determine effectiveness

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
Wildlife Biologist (2) each (GS-12) @ $39/hr X 240 Hours X 1 Fiscal year	18,720.00
Maintenance Personnel (3) each @ $30/hour x 40hours x 10 weeks (Drill seeding operations)	36,000.00
TOTAL PERSONNEL SERVICE COST	54,720.00
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
Rangeland drill seeders (2) each, Rental @ $12/acre x 8,127 acres	195,048.00
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	195,048.00
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Native Seed Mix 1 @ $250.68/ ac x 727 aerial seed acres & 4,655 drill seed acres at ½ PLS rate (~3,257acres full rate)	765,702.06
Native Seed Mix 2 @ $ 258.68/ac x 13,240 aerial seed acres & 3,472 drill seed acres at ½ PLS rate (~ 1,736 acres full rate)	3,424,923.20
Cultipack rings, bearings, grease, oil, fuel (drill seeding operations)	4,000.00
TOTAL MATERIALS AND SUPPLY COST	4,643,693.76
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Aerial Broadcast Seeding –Fixed Wing Aircraft $36/ac x ~ 16,347 acres plus mobilization cost $2,000	588,492.00
Aerial Hydromulch- Fixed Wing Aircraft $2,300/acre x 1,375 acres	3,162,500.00
Effectiveness monitoring. Contract, (3) scientists @ $50/hour X 5 weeks spring (200 hours) and 5 weeks fall (200 hours)= 60,000 per year X 1FY	60,000.00
TOTAL CONTRACT COST	3,810,992.00

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY08__	10/1/2007	7/23/2008	S	acres	368.10	23,649	8,704,453.76
						TOTAL	8,704,453.76

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	C
2.	Documented cost figures from similar project work obtained from local agency sources.	P,C,M
3.	Estimate supported by cost guides from independent sources or other federal agencies	P
4.	Estimates based upon government wage rates and material cost.	P
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

Please refer to Vegetation and Wildlife Assessments- Appendix I; Treatments Map- Appendix III.

TOTAL COST BY JURSIDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Mid-Columbia River Refuge Complex, Hanford Reach National Monument	23,649 acres	8,704,453.76
	TOTAL COST	8,704,453.76

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Emergency Stabilization Plan Development	**PART E SPECIFICATION #**	4
NFPORS TREATMENT CATEGORY*	Planning	**FISCAL YEAR(S) (list each year):**	2007
NFPORS TREATMENT TYPE *	BAER/ES Plan	**WUI? Y / N**	N
IMPACTED COMMUNITIES AT RISK	None	**IMPACTED T&E SPECIES**	Sage Sparrow, Townsend's Ground Squirrel, Ferruginous Hawk, White-Tailed Jack Rabbit, Greater Sage Grouse

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Prepare the Emergency Stabilization (ES) plan for the Wautoma Fire on the Hanford Reach National Monument.

B. Location/(Suitable) Sites: Plan has been prepared to address all land under jurisdiction of U.S. Fish and Wildlife Service within the Wautoma Fire area. Plan costs include administrative costs, salaries of planning team, and supplies.

C. Design/Construction Specifications:
1. Conduct a detailed assessment of burn severity, its impacts to lands and the threats to life and property; protect critical cultural and natural resources.
2. Write specifications based on assessment recommendations.
3. Submit plan for approval and secure funding from appropriate sources.
4. Per policy, complete annual reports with monitoring narratives and cost details.

D. Purpose of Treatment Specifications: To prepare a comprehensive ESR plan to manage or mitigate the fire impacts in order to protect life, property and critical cultural and natural resources.

E. Treatment Effectiveness Monitoring Proposed: Per policy, an annual and final accomplishment report will be prepared with detailed costs and monitoring narratives and will be completed within 7 days of fire containment (DM 620, Chapter 3).

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
TOTAL PERSONNEL SERVICE COST	

EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	

MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
FWS Assistance and Reports	10,000.00
TOTAL MATERIALS AND SUPPLY COST	10,000.0

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
TOTAL TRAVEL COST	

CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Contractor Price	80,000.00
TOTAL CONTRACT COST	80,000.00

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY07_	7/27/2007	10/15/2007	P	1		1	90,000.00
						TOTAL	90,000.00

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	M
2.	Documented cost figures from similar project work obtained from local agency sources.	

3.	Estimate supported by cost guides from independent sources or other federal agencies	
4.	Estimates based upon government wage rates and material cost.	P
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

TOTAL COST BY JURSIDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Mid-Columbia River Refuge Complex, Hanford Reach National Monument	1	90,000.00
	TOTAL COST	**90,000.00**

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Stream Channel Stabilization, Construct Rock Check Dams	**PART E SPECIFICATION #**	5
NFPORS TREATMENT CATEGORY*	Erosion/Sedimentation	**FISCAL YEAR(S) (list each year):**	2007, 2008
NFPORS TREATMENT TYPE *	Hand	**WUI? Y / N**	
IMPACTED COMMUNITIES AT RISK	Down cutting stream channel	**IMPACTED T&E SPECIES**	Townsend's Big-Eared Bat, Mule Deer, Long-Eared Myotis

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Placement of structures to slow soil and water movement in Riparian zones and stabilize soil to prevent loss or degradation of productivity. Construct rock check dams in stream channels. Rock check dams will reduce stream velocities reducing down cutting and will assist with trapping mobilized sediments. Rocks from the alluvial fan floodplain will be transported in wheel barrels or by hand to the channel and placed by hand. (See Appendix III, Maps, #19 to #22)

B. Location/(Suitable) Sites. Rock check dams will be built every 100 to 200 feet in the channel. Focusing on areas where stream banks already shown 4 to 6-inchs or more of incision (down cutting). The rock check dams will be constructed in areas of riparian vegetation.

C. Design/Construction. Rocks 6 to 8-inchs in diameter (typically) will be placed in the channel, such as to create a line of rocks across the channel from bank to bank. Occasionally rocks as large as 12-inchs can be placed in some check dams. Rock check dams will be constructed in areas where the stream channel bottom has adequate gravel armoring to prevent plunge pools from forming from overtopping events.

D. Purpose of the Treatment Specification. The rock check dams will reduce channel velocities reducing down cutting. Stream channel down cutting is a significant factor in stream channel degradation and vegetation in the riparian corridor. Placement of structures to slow soil and water movement in Riparian zones and stabilize soil to prevent loss or degradation of productivity.

E. Treatment Effectiveness Monitoring Proposed. The rock check dams will be monitored by visual inspection. Success is determined by dams that are not washed out, and banks are not further degraded.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
Personnel (2) each @ $39/hour x 12-hours x 30-days	28,080.00
TOTAL PERSONNEL SERVICE COST	28,080.00

EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	

MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
TOTAL MATERIALS AND SUPPLY COST	

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
4x4 truck, (2) each x .485/mile x 100-miles x 30-days	2,910.00
TOTAL TRAVEL COST	2,910.00

CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Teams of (3) personnel, $35/hour x 12-hours x (2) teams x 30-days = $75,600.00 (plus Equipment/Supplies/Per Diem for Crew)	104,700.00
TOTAL CONTRACT COST	104,700.00

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY08	10/01/2007	12/31/2007		4-miles	$ 33,922.50		135,690.00
						TOTAL	135,690.00

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	M, C
2.	Documented cost figures from similar project work obtained from local agency sources.	P
3.	Estimate supported by cost guides from independent sources or other federal agencies	M
4.	Estimates based upon government wage rates and material cost.	M, P
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within the Accomplishment Report.

Please refer to Watershed and Soil Assessment, Appendix I and Maps, Appendix III.

TOTAL COST BY JURSIDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Mid-Columbia River Refuge Complex, Hanford Reach National Monument	4-miles	135,690.00
	TOTAL COST	**135,690.00**

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Stream Channel, Bank Stabilization, Construct Log Dams	**PART E SPECIFICATION #**	6
NFPORS TREATMENT CATEGORY*	Erosion/Sedimentation	**FISCAL YEAR(S) (list each year):**	2007, 2008
NFPORS TREATMENT TYPE *	Hand	**WUI? Y / N**	
IMPACTED COMMUNITIES AT RISK	Erosion Stream Banks	**IMPACTED T&E SPECIES**	Townsend's Big-Eared Bat, Mule Deer, Long-Eared Myotis

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description. Placement of structures to slow soil and water movement in Riparian zones and stabilize soil to prevent loss or degradation of productivity. Construct log jams in the stream channel to reduce channel velocities and to trap mobilized gravel, sand, and silt sediment. Prevents the transport of sediment down the channel to stream reaches with lower hydraulic gradients. Prevents the further erosion of stream channels. (See Appendix III, Maps, #19 to #22)

B. Location/(Suitable) Sites. Log jams are to be constructed along stream channels that are relatively steep, already experiencing stream channel degradation (nonfunctional), and where woody debris is present in the area adjacent to the channel. Locations should be chosen where a track hoe (or other heavy equipment) can reach the channel from the existing road. The log jam will be constructed in areas that have a significant cobble bed on the stream channel to minimize down cutting in the plunge pool.

C. Design/Construction. Obtain 6 to 12-inch (typical) logs of similar species to what is present in the riparian corridor. Logs will be placed in the channel such that they form an interlocking structure that has the height of approximately 1-foot below the top of the bank. The structure should be created to allow water during low flow conditions to readily pass, without ponding.

D. Purpose of the Treatment Specification. The log jams will provide a means to slow water velocities and to prevent further down cutting of the stream bed. In addition, the log jams will trap medium to coarse sediment from being transported down the stream. These log jam will trap other woody debris entering the stream channel. Sediment and logs that enter the stream will be trapped behind the log jam. Placement of structures to slow soil and water movement in Riparian zones and stabilize soil to prevent loss or degradation of productivity.

E. Treatment Effectiveness Monitoring Proposed. Effectiveness of the log jams will be monitored by visual observations. The filling in behind log jams is a good indicator of success. Failure of 10 to 20 percent of the log jams is acceptable. This material tends to add to the next log jam downstream, adding to its effectiveness.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
Supervisor, (1) GS-12, $39/hour x 360-hours	14,040.00
TOTAL PERSONNEL SERVICE COST	14,040.00

EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	

MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
(Materials included in Contract Costs)	
TOTAL MATERIALS AND SUPPLY COST	

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
4x4 Truck @ .485/mile x 100-miles/day x 30-days	1,455.00
TOTAL TRAVEL COST	1,455.00

CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Crew Personnel: Operator/Sawyer (1) each, Laborer (2) each @ $145/hr x 10-hrs x 25-days	36,250.00
Trucks/Equipment/Per Diem	15,500.00
Mobilization/Demobilization $5,000/each x 2	10,000.00
TOTAL CONTRACT COST	71,250.00

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY08	10/01/2007	12/31/07		1.7-miles	51,026.00		86,745.00

TOTAL	86,745.00

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	M, C
2.	Documented cost figures from similar project work obtained from local agency sources.	P
3.	Estimate supported by cost guides from independent sources or other federal agencies	M
4.	Estimates based upon government wage rates and material cost.	M, P
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within the Accomplishment Report.

Please refer to Watershed and Soil Assessment, Appendix I and Maps, Appendix III.

TOTAL COST BY JURSIDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Mid-Columbia River Refuge Complex, Hanford Reach National Monument	1.7-miles	86,745.00
	TOTAL COST	86,745.00

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Stream Channel, Bank Stabilization, Vegetation, Construct/Install Elk Fencing	**PART E SPECIFICATION #**	7
NFPORS TREATMENT CATEGORY*	Erosion/Sedimentation	**FISCAL YEAR(S) (list each year):**	2007, 2008
NFPORS TREATMENT TYPE *	Hand	**WUI? Y / N**	
IMPACTED COMMUNITIES AT RISK	Erosion Stream Bank	**IMPACTED T&E SPECIES**	Townsend's Big-Eared Bat, Mule Deer, Long-Eared Myotis

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Install protective fences or barriers to protect treated or recovering areas. Install elk fencing to prevent elk from damaging stream banks, channel bottoms, and over grazing on vegetation. The fences will extend approximately 40 feet from the centerline of the stream (approximately 80 total) by 200 to 300 feet long. Each enclosed area will be separated by a maximum of 300 feet (due to limitation of electrical cable construction). Each solar powered energy source will provide protection to 5 fenced areas. (See Appendix III, Maps, #19 to #22)

B. Location/ (Suitable) Sites. The fenced protective areas will be constructed along the riparian corridor from Upper Snively Spring, along the lower portions of Snively Springs riparian corridor (below the lower springs), along the lower portions of Rattlesnake Springs (below where the creek is deeply entrenched), and around selected springs at Benson Spring.

C. Design/Construction. See bid documents.

D. Purpose of the Treatment Specification. Prevents elk from damaging stream banks, channel bottoms, and over grazing on vegetation. Installing protective fences or barriers to protect treated or recovering areas.

E. Treatment Effectiveness Monitoring Proposed. Fence integrity and survival of vegetation will be the benchmark for effectiveness of the elk fencing.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
Supervisor, (1) GS-12 @ $39/hour x 360-hours	14,040.00
TOTAL PERSONNEL SERVICE COST	14,040.00
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
TOTAL MATERIALS AND SUPPLY COST	
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
4x4 Truck @ .485/mile x 100-miles/day x 30-days	1,455.00
TOTAL TRAVEL COST	1,455.00
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Proposal @ $49,169/mile x 4-miles (9-sections fence, 300-ft. x 80 ft. with 7-wire Elk fence includes (1) energizer to power the fence and cables)	196,676.00
Mobilization/Demobilization $5,000/each x (3) sites	15,000.00
TOTAL CONTRACT COST	211,676.00

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY08	10/01/2007	3/31/2008		3.5-miles	$64,906.		227,171.00
						TOTAL	227,171.00

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	M, C
2.	Documented cost figures from similar project work obtained from local agency sources.	P
3.	Estimate supported by cost guides from independent sources or other federal agencies	M, P
4.	Estimates based upon government wage rates and material cost.	
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within the Accomplishment Report.

Please refer to Watershed and Soil Assessment, Appendix I and Maps, Appendix III.

TOTAL COST BY JURSIDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Mid-Columbia River Refuge Complex, Hanford Reach National Monument	3.5-miles	227,171.00
	TOTAL COST	**227,171.00**

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Drift/Silt Fencing	**PART E SPECIFICATION #**	8
NFPORS TREATMENT CATEGORY*	Erosion/Sedimentation	**FISCAL YEAR(S) (list each year):**	2007, 2008
NFPORS TREATMENT TYPE *	Hand	**WUI? Y / N**	
IMPACTED COMMUNITIES AT RISK	Public Safety	**IMPACTED T&E SPECIES**	Sage Sparrow, Townsend's Ground Squirrel, Ferruginous Hawk, White-Tailed Jack Rabbit, Greater Sage Grouse

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description. Install protective fences or barriers to protect treated or recovering areas. Install 4 parallel lines of silt fencing along a 9-mile segment of Hwy 240. The silt fencing will reduce wind velocities behind the fence, causing air borne dust and sand to deposit. In addition, the silt fence will create a zone of scouring, which when seeded and protected with erosion control matting, will prove a vegetative strip that will trap particles suspended in the air. The purpose is to create a zone, where the drill seed beds will not be buried by drifting sand. (See Appendix III, Maps)

B. Location/(Suitable) Sites. In a 9-mile long area adjacent to Hwy 240.

C. Design/Construction. Silt fence construction and installation is shown in other documents. The bottom portion of the silt fence will be buried in a trench a minimal of 4-inches deep. Wooden lath or other suitable material will be used to stake the fence in. The four parallel rows of silt fence will be installed approximately 100 to 200 feet apart, based on wind scour and deposition dynamics.

D. Purpose of the Treatment Specification. The silt fencing will reduce wind velocities behind the fence, causing air borne dust and sand to deposit. In addition, the silt fence will create a zone of scouring, which when seeded and protected with erosion control matting, will prove a vegetative strip that will trap particles suspended in the air. Installing protective fences or barriers to protect treated or recovering areas.

E. Treatment Effectiveness Monitoring Proposed. Success will be monitored by observation of the growth of vegetation, areas protected by the erosion control matting not being buried, and a reduction of dust hazard along Hwy 240.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
Supervisor, (1) GS-12 @ $39/hour x 360-hours	14,040.00
TOTAL PERSONNEL SERVICE COST	14,040.00

EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	

MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
975-Rolls (50 ft. rolls) 9-miles x $100/each	97,500.00
TOTAL MATERIALS AND SUPPLY COST	$ 97,500.00

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
4x4 Truck @ .485/mile x 100-miles/day x 30-days	1,455.00
TOTAL TRAVEL COST	1,455.00

CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Installation of drift fence @ $20/each, per estimate from fence supplier	19,500.00
Per Diem/Trucks/Equipment	5,000.00
TOTAL CONTRACT COST	137,495.00

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY08	10/01/2007	3/31/2008		Rolls	141.02	975	137,495.00
						TOTAL	137,495.00

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	M, C
2.	Documented cost figures from similar project work obtained from local agency sources.	P
3.	Estimate supported by cost guides from independent sources or other federal agencies	M, P
4.	Estimates based upon government wage rates and material cost.	
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within the Accomplishment Report.

Please refer to Watershed and Soil Damage Assessment, Appendix I; Specification #8, Part F; and Maps, Appendix III.

TOTAL COST BY JURSIDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Mid-Columbia River Refuge Complex, Hanford Reach National Monument	975-rolls	137,495.00
	TOTAL COST	**137,495.00**

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Erosion Control, Matting, Erosion, Jute	**PART E SPECIFICATION #**	9
NFPORS TREATMENT CATEGORY*	Erosion/Sedimentation	**FISCAL YEAR(S) (list each year):**	2007, 2008
NFPORS TREATMENT TYPE *	Hand	**WUI? Y / N**	
IMPACTED COMMUNITIES AT RISK	Seed Bed Matting	**IMPACTED T&E SPECIES**	Sage Sparrow, Townsend's Ground Squirrel, Ferruginous Hawk, White-Tailed Jack Rabbit, Greater Sage Grouse

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description. Place structures (e.g. matting) to slow soil movement; stabilize soil using matting to prevent loss or degradation of productivity. Install erosion control matting along the side of the silt fence (specification 8) where wind scours soil. The erosion control matting will protect the drill seeded beds from being eroded by the wind. The vegetation, once established will reduce wind blown dust and sand from migrating onto Hwy 240, causing a threat to public health, welfare, and safety. (See Appendix III, Maps)

B. Location/(Suitable) Sites. Sites are adjacent to the silt fencing. The area adjacent to Highway 240 is exposed to high winds funneled down Cold Creek and Dry Creek valleys and is comprised of soils that have a highly susceptibility of wind erosion.

C. Design/Construction. Erosion control matting will be in strips approximately 20 to 50 feet wide. The matting will be secured with staples. A soil tacifier will be added to assist in reducing wind erosion. Installing protective fences or barriers; placing structures (e.g. matting)

D. Purpose of the Treatment Specification. To protect treated or recovering areas; to slow soil and water movement; stabilize soil using matting to prevent loss or degradation of productivity.

E. Treatment Effectiveness Monitoring Proposed. Monitor wind scouring of seed beds and burial by blowing wind to determine success.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
Supervisor, (1) GS-12 @ $39/hour x 240-hours	9,360.00
TOTAL PERSONNEL SERVICE COST	9,360.00
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Jute matting 12-inch (1,280-rolls), stakes; 9-miles x 48 ft. width	384,000.00
TOTAL MATERIALS AND SUPPLY COST	384,000.00
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
4x4 Truck @ .485/mile x 100-miles/day x 20-days	970.00
TOTAL TRAVEL COST	970.00
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Personnel (3) each @ $35/hour x 10-hours x 20-days to install Jute matting and seed, per enclosed native seed mix #1 under Jute Matting	65,000.00
TOTAL CONTRACT COST	65,000.00

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY08	10/01/2007	3/31/2008		Miles	$51,036	9	459,330.00
						TOTAL	459,330.00

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	C, F
2.	Documented cost figures from similar project work obtained from local agency sources.	P
3.	Estimate supported by cost guides from independent sources or other federal agencies	M, P, T
4.	Estimates based upon government wage rates and material cost.	
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within the Accomplishment Report.

Please refer to Watershed and Soil Damage Assessment, Appendix I and Maps, Appendix III.

TOTAL COST BY JURSIDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Mid-Columbia River Refuge Complex, Hanford Reach National Monument	9-miles	459,330.00
	TOTAL COST	**459,330.00**

PART F - INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Native Seeding, Floodplain	**PART E SPECIFICATION #**	10
NFPORS TREATMENT CATEGORY*	Erosion/Sedimentation	**FISCAL YEAR(S) (list each year):**	2007, 2008
NFPORS TREATMENT TYPE *	Hand	**WUI? Y / N**	
IMPACTED COMMUNITIES AT RISK	Broadcast Seeding	**IMPACTED T&E SPECIES**	Sage Sparrow, Townsend's Ground Squirrel, Ferruginous Hawk, White-Tailed Jack Rabbit, Greater Sage Grouse

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description. The specification will stabilize soil to prevent loss or degradation of productivity by seeding to prevent establishment of invasive plants within the burned area. A mixture of native grass seeds Mix #1 and Mix #2, per Specification #3 will be planted. (See Appendix III, Maps)

B. Location/(Suitable) Sites. Sites and 1 and 2.
1. Broadcast seed along 50 acres in Upper Snively, Lower Snively, Benson, and Lower Rattlesnake riparian corridors.
2. Broadcast seed in the portions of Cold Creek and Dry Creek drainages

C. Design/Construction. Stabilize soil to prevent loss or degradation of productivity by seeding to prevent establishment of invasive plants; and direct treatment of invasive plants and by using integrated pest management techniques to minimize the establishment of non-native invasive species within the burned area.

D. Purpose of the Treatment Specification. To prevent establishment of invasive plants, direct treatment of invasive plants, and to minimize the establishment of non-native invasive species within the burned area.

E. Treatment Effectiveness Monitoring Proposed. See Part F, Specification #3.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	**COST / ITEM**
Supervisor, (1) GS-12 @ $39/hour x 240-hours	9,360.00
TOTAL PERSONNEL SERVICE COST	9,360.00

EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	

MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
TOTAL MATERIALS AND SUPPLY COST	

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
4x4 Truck, .485/mile x 100-miles/day x 30-days	1,455.00
TOTAL TRAVEL COST	1,455.00

CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Personnel (2) each @ $30/hour x 10-hours x 20-days to hand seed areas by ATV, per Specification #3 (includes Per Diem & Truck)	48,000.00
TOTAL CONTRACT COST	48,000.00

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY08	10/01/2007	3/31/2008		50	$ 2,136.		106,815.00
						TOTAL	106,815.00

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	M, C
2.	Documented cost figures from similar project work obtained from local agency sources.	P
3.	Estimate supported by cost guides from independent sources or other federal agencies	M, P
4.	Estimates based upon government wage rates and material cost.	
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within the Accomplishment Report.

Please refer to Watershed and Soil Damage Assessment, Appendix I and Maps, Appendix III.

TOTAL COST BY JURSIDICTION

JURISDICTION	UNITS TREATED	COST
U.S. Fish and Wildlife Service, Mid-Columbia River Refuge Complex, Hanford Reach National Monument	50	106,815.00
	TOTAL COST	**106,815.00**

PART G - POST-EMERGENCY STABILIZATION REQUIREMENT

The following are post-emergency stabilization, implementation, operation, maintenance, monitoring, and evaluation actions after three years from the control of the fire to ensure the effectiveness of initial investments. Estimated annual cost and funding source is indicated.

1. Maintain access and service roads (grading, spraying, mowing) ($20,000 – 1262)
2. Maintain fire breaks (disking, mowing, spraying) ($20,000 – 9131)
3. Maintain fences and signs ($4,000 – 1262)
4. Continue invasive species monitoring and control ($20,000 – 1261)
5. Manage biological control insectories/population reservoirs for transfer to other sites as needed/available (GS-09 Wildlife Biologist, 80 hours, $1,640 – 1261)
6. Revisit photo-monitoring points (GS-09 Wildlife Biologist, 60 hours, $1,230 – 1261)
7. Monitor native plantings (GS-09 Wildlife Biologist, 80 hours, $1,640 – 1261)
8. Monitor rare plant populations/sensitive vegetation (GS-09 Wildlife Biologist, 60 hours, $1,230 – 1261)
9. Wildlife resource monitoring/sensitive species surveys (GS-11 Wildlife Biologist, 320 hours, $8,160 – 1261)
10. Monitor channel stabilization and riparian recovery (GS-09 Wildlife Biologist, 60 hours, $1,230 – 1261)
11. Continue riparian rehabilitation/restoration (GS-09 Wildlife Biologist/YCC Crew, 120 hours, $4,920 – 1261)
12. Maintain and relocate protective fencing as needed ($16,000 – 1262)
13. Produce publications and reports, and coordinate University research related to fire and arid lands ecology (GS-12 Research Biologist, 120 hours, $3,600 – 1261)
14. Provide education and interpretation of stabilization/rehabilitation area (GS-11 Outdoor Recreation Planner, 40 hours, $1,020 – 1263)
15. Cultural Resource protection (GS-09 LE Officer, 320 hours, $6,560 – 1264)
16. Cultural Resource management, including Tribal cooperation and coordination (quarterly meetings, GS-11 Cultural Resource Specialist, 40 hours plus travel costs, $1,600 – 1261)

PART H - CONSULTATIONS

Please see Consultations within each specific Resource Damage Assessment report.

APPENDIX I - BURNED AREA ASSESSMENT REPORTS

BURNED AREA EMERGENCY STABILIZATION PLAN
WAUTOMA FIRE- MID-COLUMBIA RIVER NATIONAL WILDLIFE REFUGE COMPLEX, HANFORD REACH NATIONAL MONUMENT

RESOURCE ASSESSMENTS

- **CULTURAL RESOURCE DAMAGE ASSESSMENT**
- **VEGETATION AND SOILS RESOURCE DAMAGE ASSESSMENT**
- **WILDLIFE RESOURCE DAMAGE ASSESSMENT**
- **OPERATIONS RESOURCE ASSESSMENT**
- **WATERSHED AND SOIL DAMAGE ASSESSMENT**

BURNED AREA EMERGENCY STABILIZATION PLAN
WAUTOMA FIRE
CULTURAL RESOURCE DAMAGE ASSESSMENT

I. OBJECTIVES

The overall objective of this report section is to provide recommendations for additional cultural resources damage assessment as follows:

- Assess damage to known historic and prehistoric cultural resources as a result of fire behavior and suppression activities.
- Assess potential future risks to known/documented cultural resources as a result of the fire (e.g. erosion, flooding).
- Assess potential risks to known cultural resources as a result of emergency stabilization activities for other resources.
- Coordinate with Federally recognized Tribes.

II. ISSUES

- Identify known/documented resources that have been subject to direct or indirect effects of fire and fire suppression actions.
- Identify emergency stabilization and/or protection needs for cultural resources within the fire.
- Other resources stabilization measures that may put cultural resources at risk.
- Consultation with appropriate parties to meet legal compliance and tribal consultation.

III. OBSERVATIONS

A. Background

The following information is derived from several widely available sources including the 24 Command Fire Burned Area Emergency Rehabilitation Plan (June, July 2000), 24 Command Fire Burned Area Emergency Rehabilitation Plan Amendment (December 17, 2001), 24 Command Fire Burned Area Emergency Stabilization and Rehabilitation (BAER) Plan, Final Accomplishment Report for 2000-2003 Treatments, and is intended to be a cursory overview of present knowledge to provide a context within which the fire, suppression activity, post-suppression inventory, and recommended cultural resource prescriptions may be considered. Supporting documents are cited in the References.

The Wautoma Fire, number 13580-9141-DVD0, started on August 16th, 2007. It was determined that the fire was human caused and details associated with the cause of the fire are still under investigation. The Wautoma Fire burned 72,641 acres including 51,356 acres within U.S. Fish and Wildlife Service jurisdiction on the HRNM, 10,102 acres on Department of Energy Hanford Site to the east of the Washington State Road 240, and 11,183 acres on private lands west of the Monument in Benton County,

Washington. Fire suppression impacts included: 31.67 miles of disk/bulldozer were constructed on the perimeter of the Wautoma Fire, and 13.21 miles of disk/dozer line on the HRNM. The estimated damage to resources on the Monument from dozer/disk lines is 25.6 acres (based on average 16 foot width).

The HRNM has a large number of historic and prehistoric sites recorded within its boundaries. Most of the historic properties are related to the Hanford Site's nuclear development, including the Manhattan Project, Cold War developments, and cleanup activities associated with decommissioning of the facilities. In addition, there are pre-Hanford homesteads that were displaced in 1943 for the Hanford Site. The prehistoric component is primarily known from earlier work done by a number of archaeologists at large village sites along the Columbia River, as well as other sites located during National Historic Preservation Act, Section 106 compliance surveys (Source: Alex Bourdeau, USFWS).

The prehistoric cultural chronology of the Hanford Site area is taken from the *National Register of Historic Places Multiple Property Documentation Form – Historic, Archaeological and Traditional Cultural Properties of the Hanford Site, Washington* (U.S. Department of Energy 1997). The chronology summary states:

The prehistoric Columbia Plateau region has been impacted by basalt flows, catastrophic flooding, and environmental change which has meant that prehistoric regional inhabitants adapted their cultural subsistence systems as necessary to survive. The moist, cool conditions of the early Holocene meant that early peoples [12-15,000 B.P. to 8,000 years B.P.] were probably mobile, taking advantage of available resources in an organized fashion.

As the environment became drier after 8,000 years B.P., it is likely that the descendants of these early people developed a more mobile, generalized riverine-based economy. The arrival of a moist and cool environment at approximately 4,500 years B.P. was coupled with year-round residency and a hunter-gatherer subsistence pattern which was modified briefly at 3,800 years B.P.

Approximately four-hundred years later, circa 3,400 years B.P., the climate cooled once again but the sedentary lifestyle did not return to the study area until 3,000 years B.P. After this point, populations increased along the rivers as groups focused on salmon, roots and ungulates. A significant increase in storage and food processing activities were common to many people throughout the Columbia Basin although the mobility of the hunter-gatherer lifestyle remained a strong component into the ethnographic period (1997:2-1) (Source: Alex Bourdeau, USFWS).

Two archaeological districts, each containing numerous and mostly unrecorded prehistoric archaeological sites, have been identified in the Wautoma Fire Area. Both of these districts are listed in the NRHP. Rattlesnake Springs Archaeological District includes sites 45BN170 and 45BN171. Snively Canyon Archaeological District includes sites 45BN172 and 45BN173 (Source: 24 Command Fire Cultural Resources

Assessment, June/July 2000).

The Ethnographic/Contact Period (1805-1943) extends from the time of first Euroamerican contact to when Native Americans were excluded from settlement and/or use of the area. This period reflects both a continuity of earlier, pre-Contact lifeways and subsequent changes to Euroamerican building styles and incorporation of Euroamerican materials. During this period, Native groups ceded lands and were, for the most part, moved onto reservations. At the present time, the Federally-recognized Confederated Tribes of the Umatilla Indian Reservation, Yakama Indian Nation, Confederated Tribes of the Colville Indian Reservation, Nez Perce Tribe and the non Federally-recognized Wanapum have expressed interest in this area (U.S. Department of Energy 1997:3.4-3.35).

Euroamerican Resettlement on the Hanford Site (1805-1943): The Historic Period began with the passage of the Lewis and Clark expedition (1805-1806) near the area. Subsequent to this came the passage of missionaries, mining, ranching, establishment of trading posts, river travel and community development (U.S. Department of Energy 1997:4.6-4.21). With the possibility of grazing and limited homestead use, the area within the Wautoma Fire appears to have been bypassed by historic development in favor of other locations with better access to water.

Hanford Development (1943-1990). The history associated with the Hanford Site and its nuclear development is included in History *of the Hanford Site 1943-1990* (Harvey n.d.) and *History of the Plutonium Production Facilities at the Hanford Site Historic District, 1943-1990. Manhattan Project 1943-1946, Cold War Era 1947-1990*. (U.S. Department of Energy 2002).

Natural gas was discovered on Rattlesnake Mountain in the 1920's but the deposits proved too small to be a major continuing economic force. The remains of numerous exploration sites and gas wells are scattered along the foot of Rattlesnake Mountain. The federal government acquired the land for the Hanford Engineer Works in 1943 and proceeded to evacuate all civilians (Indians and whites) from the area. Subsequent removal of much of the standing structures created a large historic archaeological district at the Hanford Site.

Since the Wautoma Fire occurred on lands that were acquired as a buffer for the Hanford Site, no development occurred from 1943-1950. Beginning in 1950, Cold War tensions resulted in military presence at Hanford. In 1950, the first 16 anti-aircraft artillery batteries were established to encircle and protect Hanford's nuclear reactors. The typical layout of a battery covered about 20 acres and had up to 20 associated buildings and structures. Beginning in 1954, the U.S. Army began supplementing the anti-aircraft artillery guns with NIKE surface to air missiles and, by late 1957-early 1958, had phased-out the artillery sites within the fire area (Harvey 2002:2-93 – 2-96). The battery sites were later razed at some unspecified date after their deactivation. (Source: 24 Command Fire Cultural Resources Assessment, June/July 2000).

B. Methodology and Results

The first step in conducting a Cultural Resource Damage Assessment is identifying locations of historical properties and other culturally significant locations within the fire suppression and burn areas. Site specific information was requested from the U.S. Fish and Wildlife by the Cultural Resource Specialist. This information was not made available to incorporate into this assessment.

The BAER Team site visit included motoring between 14 discrete observation locations within the burn area, The BAER Team Cultural Resource Specialist was available in an advisory capacity and was not present during the BAER Team's burn area site visit. Although the limited reconnaissance was not sufficient to fully assess the cultural resource damage resulting from the fire and fire suppression activities, the following effects of fire suppression were observed during the burned area site visit:

-Vehicular off-road track marks as indicated by denuded vegetation;
-Disk-line areas along the periphery and selected areas as indicated by denuded vegetation;
-Fire retardant soil stains.

Based on these observations, it is possible that fire suppression activities listed above may have disturbed or displaced features of both previously recorded and unrecorded cultural resources. The operation of fire fighting equipment beyond fire lines and roads also has the potential to affect sites. In addition, the fire may have exposed sites previously covered with vegetation, particularly along the Riparian zones. There is some potential that increased wind erosion may deflate sites previously protected by vegetation.

BAER policy recognizes cultural resources as a critical resource requiring assessment and protection. A guiding principle as well as a legal requirement of burned area rehabilitation is to regard archaeological sites and other materially fragile cultural resources when proposing emergency rehabilitation treatments. If post-fire conditions indicate erosion threats or other actual or potential watershed problems, cultural resources must receive special attention to ensure that their unique and irreplaceable values are given full consideration.

Protection of human life and property from wildfire takes precedence over the protection of historic and prehistoric cultural properties. However, the diminishing numbers of archaeological sites, traditional cultural properties and other resources of cultural importance representing millennia of human life must be provided protection whenever possible.

Incident-related damages to cultural resources fall in two broad categories: fire-related and suppression-related. Fire-related impacts are dependent on the severity of the incident and can include thermal fracture of obsidian, basalt, chert, granite and other stone artifacts; destabilization or destruction of structures and features. Other impacts

include destruction of organic elements or midden deposits at the site, destabilization of soils within a site or landscape with resultant increased erosion and deflation of loosened sediments. Indirect impacts may arise from increased susceptibility to looting and surface collection due to greater visibility.

Suppression related impacts occur with disturbance or destruction from dozer or hand line construction or equipment staging. Stabilization and rehabilitation activities also may cause impacts, including restoration of dozer and hand lines, silt basin construction, restoration of range and forest land, and replacement of infrastructure.

C. Findings of Previous Onsite Assessments and Studies

The Wautoma Fire was almost entirely within the footprint of the 24 Command Fire. The 24 Command Fire cultural resource assessment performed in July 2000 addressed possible effects to a minimum of 190 previously recorded historic and prehistoric archaeological sites. A total of 136 sites had previously been recorded. Sites consisted of prehistoric (46) and historic (45) sites plus 12 sites with both historic and prehistoric components. Several isolated finds were also represented with 18 prehistoric and 15 sites. Historic site types included Euro-american homesteading and ranching activities, sheep herding, and transportation systems. Artifacts and features associated include rock cairns, and domestic debris scatters, cisterns, gas wells, and ditches. Prehistoric site types consist of rock cairns, litic scatters, isolated project points and other tools. According to the Final Implementation Report (2003), cultural damage was minimal (Source: 24 Command Fire Burned Area Emergency Stabilization and Rehabilitation (BAER) Plan, Final Accomplishment Report for 2000-2003 Treatments).

These sites range from lithic scatters to can scatters, Indian hunting sites to ranch buildings, spirit quest monuments to gas production wells. As many of these sites can occur within the same physical space rehabilitation can be quite complex.

As part of the 24 Command Fire cultural assessment, a preliminary inventory of pre-historic and historic sites on the ALE was conducted by archaeologists assigned to the BAER team. Of the 19 sites marked on maps in the Smithsonian trinomial system 8 were visited. Two other locations were noted in transit and inspected. Subsequent review of site maps indicated that one of these locations had been recorded as several sites but none were issued trinomial site numbers. One site appears to have be an unrecorded spirit quest monument. The second location has components from several periods of occupation, including many fragments of depression era glass. The glass had not been melted, spalled, shattered, or otherwise severely altered by the fire. This observation was also noted for lithic debris at prehistoric sites. However, wood structures, such as a corral, were apparently destroyed by the 24 Command fire (Source: 24 Command Fire Cultural Resources Assessment, June/July 2000).

The Wautoma Fire burned 72,641 acres including 51,356 acres within U.S. Fish and Wildlife Service jurisdiction on the HRNM, 10,102 acres on Department of Energy Hanford Site to the east of the Washington State Road 240, and 11,183 acres on

private lands west of the Monument in Benton County, Washington. Fire suppression impacts included: 31.67 miles of disk/bulldozer were constructed on the perimeter of the Wautoma Fire, and 13.21 miles of disk/dozer line on the HRNM. The estimated damage to resources on the Monument from dozer/disk lines is 25.6 acres (based on average 16 foot width). These areas need to be surveyed to assess whether cultural resources were affected or could be further degraded.

The entire fire has been mapped by the U.S Fish and Wildlife Service for burn severity. Within shrub-steppe upland habitat areas approximately 73 percent of the fire area is classified as low burn severity and 22 percent of the fire area is classified as moderate severity with less than 1 percent mapped as high burn severity. The fuels within the upper riparian areas were completely consumed due to the available fuel. To assess whether historical property could have been affected and/or exposed by repeated area burning, it is recommended that a survey be conducted in the severe burn areas including but not limited to the upper riparian zones.

To conform with Section 106, further cultural resource damage assessments will be required prior to implementation of ground disturbing stabilization actions.

IV. RECOMMENDATIONS

Site specific cultural resource location information provided by the U.S. Fish and Wildlife Service indicated that between 112 to 125 cultural locations could have been affected by the Wautoma Fire. It is recommended that cultural resources location data be evaluated to enable a systematic and target field assessment. A cultural resources damage assessment field methodology can be developed based on site type and its susceptibility to fire related impacts, as well as its National Register of Historic Places status and significance. Once sites are selected for assessment, field work would include a basic inspection to characterize fire damage with minimally intrusive techniques. Field inspection would also include assessing long-term risk of potential fire-related degradation to the site from multiple fires. Inspections would be documented on conditions assessment forms. Field methodology can be coordinated with Washington State Historic Preservation Office and appropriate tribes. It should be noted that the five (5) area tribes are very active and vocal, and regularly participate in Hanford preservation activities.

It is recommended that fire lines and other areas where suppression activities occurred be systematically surveyed for the presence of previously unreported sites and to determine if the known sites mapped near fire lines were actually affected. If any such sites were affected, it is recommended that damage be reasonably characterized to support stabilization treatment recommendations. For impacted sites, eligibility determinations can be made for the National Register of Historic Places, for previously unrecorded sites and recorded sites with no determination. If it is determined that any site(s) is eligible, then stabilization and/or mitigation measures should be developed in consultation with the Washington State Historic Preservation Office and appropriate tribes.

If ground-disturbing activities are proposed for other resources under emergency stabilization, Section 106 consultation, including appropriate tribal consultation, should be included in the planning and execution process for that specification.

Emergency Stabilization: (specification related)

The following specification, Part F, Specification #1 is offered to assist in protecting the cultural resources from the impacts of the Wautoma Fire:

A. Perform a cultural resources data evaluation to inventory and identify cultural resources including but not limited to historic and prehistoric properties within the burn and fire suppression areas. The evaluation will include a damage assessment field methodology for performing a site reconnaissance inspection.
B. Conduct a field reconnaissance inspection on sites and areas identified in the data evaluation. For estimating purposes, the number of sites to be visited and/or addressed is 123; the number of sites calculated based on 190 sites identified in the Command 24 Fire multiplied by the fraction of area burned in the Wautoma Fire versus the Command 24 Fire.
C. Develop mitigation, rehabilitation or monitoring recommendations, measures and cost estimates for each site that may be threatened by burial, destabilization, exposure to the public, or erosion consequent to fire/suppression effects.
D. Initiate consultation with Tribal governments, Native American Indian communities and SHPO as required under 36 CFR 800.

V. CONSULTATIONS

The detailed scoping document of the proposed cultural resources assessment will be prepared based on coordination/consultations with the following agencies/stakeholders:

- Washington State Historic Preservation Office (WA SHPO) to verify that Section 106 NHPA procedures will be followed for any treatments that may affect cultural resources.
- Pacific Northwest National Laboratory – Contact: Darby Stapp, Project Manager, Cultural Resources Project Manager, Richland, Washington.
- Confederated Tribes of the Umatilla Indian Reservation
- Yakama Indian Nation
- Confederated Tribes of the Colville Indian Reservation
- Nez Perce Tribe
- Wanapum Tribe

VI. REFERENCES

United States Department of Fish and Wildlife.
Overlook Fire, Burned Area Emergency Response Plan, August 2007

United States Department of Fish and Wildlife.
24 Command Fire Burned Area Emergency Rehabilitation Plan (June, July 2000),

United States Department of Fish and Wildlife.
24 Command Fire Burned Area Emergency Rehabilitation Plan Amendment (December 17, 2001),

United States Department of Fish and Wildlife
24 Command Fire Burned Area Emergency Stabilization and Rehabilitation (BAER) Plan, Final Accomplishment Report for 2000-2003 Treatments.

BURNED AREA EMERGENCY STABILIZATION PLAN
WAUTOMA COMMAND FIRE
VEGETATION RESOURCE DAMAGE ASSESSMENT REPORT

I. OBJECTIVES

- Evaluate and assess the impacts of fire and fire suppression to vegetation resources and identify other natural resource values at risk associated with vegetation losses.
- Identify and locate threatened and endangered plant species impacted by the fire and/or fire suppression actions.
- Determine emergency stabilization and monitoring needs supported by specifications to aid in vegetation recovery and soil stabilization.
- Evaluate the potential for encroachment of invasive species into native plant communities within the burned area.
- Provide management recommendations to assist in vegetation recovery, watershed stabilization, site productivity and species habitat protection and rehabilitation.

II. ISSUES

- Protection of other resource values including site productivity, wildlife habitat, vegetation resources, cultural resources, and watershed stability.
- Monitoring of impacted lands for the early detection and control of invasive and noxious weed species.
- Stabilization of watershed and riparian areas.
- Determine impacts of fire to ten plant species that are federal Candidates for Endangered status and/or State-listed Threatened, Endangered and Sensitive and/or their habitat.
- Develop management strategies that provide for the stabilization, natural regeneration and recovery of impacted areas.
- Immediate stabilization of denuded soils (i.e. vegetation has been removed) that may impact or redirect ecological function.
- Monitoring of the planting/seeding effectiveness of emergency stabilization efforts according to plan specifications.

III. OBSERVATIONS

A. Background Information

The Hanford Reach land base, originally established in 1943 by the US Government as a national security area for the production of weapons-grade plutonium, has restricted public access and has been free of agricultural influences for over four decades. Because of this fact the area has preserved, an immense natural habitat which now serves as a refuge for native plants and animals. Within the area is a mosaic of habitats that support a wealth of increasingly uncommon native plant and animal species which

is unmatched in the Columbia Basin (Clinton 2000). Because of the high diversity of native plant and animal species, the large number of rare and sensitive plant species, and significant breeding populations of nearly all steppe and shrub-steppe dependent species, the U.S Fish and Wildlife Service (FWS) has been tasked to preserve and protect these objects of antiquity in perpetuity(USFWS 2000).

This report identifies and addresses known and potential impacts to vegetation within this preserved habitat by the Wautoma Fire, located on the Rattlesnake Mountain Area of the Hanford Reach National Monument. The fire ignited on August 16, 2007 near the Wautoma Road in northwestern Benton County near the Department of Energy (DOE) Hanford Site. Fueled by erratic winds, extreme day-time temperatures, and dry fuel conditions, the fire spread quickly throughout the Arid Lands Ecologic Refuge (ALE). The burned area consists of approximately 72,641 acres of contiguous area, 51,356 of which were within the boundaries of the Hanford Reach National Monument (Monument), and 21,285 of which were private and DOE lands.

Vegetative resources were extensively impacted by this fire on federal, county, and private, lands that can be described as Columbia Basin shrub-steppe plant communities, many of which are considered high-quality or sensitive vegetation suitable for wildlife forage and when intact, offer quality soil stabilization. Seven riparian zones can be found in spring-fed areas that support significant stands of native willows *(Salix sp.)*, cattails *(Typhus latifolia)*, wood rose *(Rosa woodii)*, quaking aspen *(Populus tremuloides)*, and current *(Ribes aureum)*. These areas can provide valuable wildlife habitat, especially for amphibians and crawfish, and feeding/nesting/perch sites for birds and bats in an otherwise arid landscape. Additionally, these vegetation resources can provide forage and cover for a variety of wildlife species, aesthetic values, watershed stability, and promote biologically diverse plant associations (USFWS 2007).

Findings and recommendations contained within this stabilization plan are based upon field reconnaissance of the burned area, interviews with local resource specialists, local land managers, and review of relevant documents and literature. This report will detail the known damage to the vegetation and soil resources, will discuss re-vegetation processes and future monitoring criteria, and will outline management considerations for recovery of vegetation resources.

B. Reconnaissance methodology

On August 27, 2007, the First Strike/Shaw Environmental BAER Team assembled at the U.S. Fish and Wildlife Office in Richland, Washington, initializing the start of the Emergency Stabilization (ES) assessment plan. Ground reconnaissance of the fire was conducted on August 28, 2007, with the aid of U.S. Fish and Wildlife Service staff member, Kevin Goldie. Mr. Goldie has photos taken directly after the fire and the BAER team took photographs at the time of the ES reconnaissance, some of which can be found in the photo documentation section of this plan, Appendix IV. The fire consumed the area are on the eastern slope of Rattlesnake Mountain from peak to lower elevation and crossing the SR 240 highway near the area of the Hanford Nuclear Reservation.

Vegetation resources were significantly reduced on approximately 90-100 percent of the fire area due to extremely dry conditions and high wind. The northeast facing slope of Rattlesnake Mountain alone suffered nearly complete loss of vegetation with the mortality rate between 95-100 percent of all vegetation and standing biomass (cover). The Wautoma Fire consumed 90 percent of the standing biomass that had regenerated after the Command 24 Fire within the fire boundary including shrubs, grasses, forbs, and injuring the remaining shrubs through heat scorch over the remaining 10 percent of the fire area. Crown tissue of perennial grasses such as bunchgrass showed a mortality rate of 10 percent in areas with low fire severity and up to 90 percent in areas with extreme burn. The Wautoma Fire also consumed 29 sample plots planted after the Command 24 fire (Please see Command 24 Sample BAER Hand Planting Areas map, Appendix III). These plots were showing positive regeneration characteristics in support of replanting efforts (Please see photo documentation- Appendix III. Blowing dust and ash was observed in areas where all vegetation had been burned and the soils where no longer stabilized by the vegetation. (Please see photo documentation – Appendix V).

On August 29, 2007, the Vegetation Specialist met with representatives from FWS to obtain issues and objectives for emergency rehabilitation actions, baseline information pertaining to known impacts and information related to vegetation resources at the Monument. This meeting verified that the Monument contains many rare and sensitive plant communities and endemic species that have been lost or significantly-reduced throughout all or a significant portion of their range. Sensitive and rare plant communities have been defined as those that are foundation plant communities, representing historic conditions within the Columbia Basin eco-region and have been identified as either state ranked, globally rare, or ecologically significant within western shrub-steppe environments (USFWS 2006). The Wautoma Fire damaged/destroyed these plants identified as sensitive and ecologically-significant which signify intact plant communities representing historical vegetation conditions and may be irreplaceable or irrevocably damaged by invasion of noxious weeds if left to regenerate naturally (Please see Sensitive Plant Communities map and Rare Plants map, Appendix III). Stabilization of these areas is critical to protect and prevent further degradation of the listed plants habitats.

The fire area within Riparian zones (44 acres of Riparian habitat) varied from modest to intense damage including areas such as Mid-Snively Creek where 100 percent vegetation loss occurred. The overstory of a native Aspen stand fueled the fire at Mid-Snively, boiling the creek, killing crawfish and other riparian species, and creating hydrophobic soils which will require special methods of seeding for riparian stabilization. Less-critical areas experienced 60 to 90 percent vegetation loss damaging understory plants such as native grasses and cattails.

Plant associations were inspected to determine losses, requirements for stabilization efforts, and recovery potentials. Observations were made of fire impacts to duff layers and live crown tissue on grass and shrub species. Direct fire impacts have been documented for all plant communities, based upon consultation with local staff, and after reviewing the burned areas within the fire perimeter through visual assessment,

photos, and map documentation.

C. Findings

1. Vegetation:

The Wautoma Fire burned approximately 51,356 acres of federal lands south of Highway 24 and west of Highway 240 consuming the eastern facing slope of the Rattlesnake Ridge area of the Monument. The diversity and vast size of native plant communities found on the Hanford Site is unmatched in the ecoregion. The Monument area was identified as unique and deserving of full protection by Presidential proclamation in 2000. One of the unique features of the Monument that contributed to its establishment is the diversity and vast size of native plant communities. The area has been surveyed by The Nature Conservancy of Washington and the Washington Natural Heritage Program. These surveys have identified a total of 17 terrestrial, native plant community types (or elements) that occurred as 48 separate element occurrences on the Monument. These elements are unique in the state for their character and plant associations. Additionally, 112 populations/occurrences of 28 rare plant taxa were located across the Hanford Site (TNC 1999). Throughout the Columbia Basin Ecoregion, a number of different plant association zones occur as climatic climaxes (i.e., the plant association or community expected to occur in typical sites in the absence of disturbance). The largest and driest of these zones is the big sagebrush *(Artemisia tridentata)* / bluebunch wheatgrass *(Pseudoroegneria spicata [=Agropyron spicatum])* association. This association occupies the center of the Columbia Basin Ecoregion, which includes the Wautoma Fire area in the ALE. In general, the big sagebrush / bluebunch wheatgrass association is characterized by four layers of vegetation—an overstory layer composed mostly of big sagebrush up to two meters tall, a tall understory layer of bluebunch wheatgrass, a short understory dominated by Sandberg's bluegrass *(Poa sandbergii [included within Poa secunda])*, and a layer of algae, lichens and mosses on the soil surface (i.e., the microbiotic crust). The microbiotic crust is a critical component of native grasslands and shrub-steppe communities. This diminutive community of mosses, lichens, liverworts, algae and bacteria stabilizes the soils and fills the interstitial space between bunchgrass clumps. Perennial forbs are a minor constituent of the tall understory layer, whereas most annual forbs occur in the short understory layer. Other shrubs that may be present include rabbitbrush *(Chrysothamnus spp.)*, bitterbrush (Purshia tridentata), spiny hopsage *(Grayia spinosa)*, black greasewood (*Sarcobatus vermiculatus)* and three-tip sagebrush *(Artemisia tripartita)*. Additional locally abundant bunchgrasses include needle-and-thread *(Stipa comata)*, Indian ricegrass *(Oryzopsis hymenoides)*, Cusick's bluegrass *(Poa cusickii [included within Poa secunda])* and Idaho fescue *(Festuca idahoensis)* (USFWS 2007).

Plant associations within the Wautoma fire include natural bunchgrass mosaic, three-tip sage/bluebunch wheatgrass, big sagebrush/cheatgrass *(Bromus tectorum)*, big sagebrush/bluebunch wheatgrass, black greasewood/alkali saltgrass (*Distichilis stricta,*) and abandoned agricultural fields dominated by forbs and annual grass communities.

Topography, aspect, and elevation dictate the variability of the vegetative communities within the fire area as well as the soil textures and depths (Smith 2000).

Primary plant communities impacted by the fire included the following plant associations:

Big Sagebrush/Bluebunch wheatgrass: This community type is characterized by big sagebrush, bluebunch wheatgrass, Sandberg's bluegrass (*Poa secunda)*, diverse forbs, and where relatively undisturbed, a robust microbiotic crust. This community is widely disbursed throughout the region in loamy soil types although it is frequently associated with a understory cover of cheatgrass.

Big Sagebrush/Sandberg's bluegrass: This community type is characterized by big sagebrush, Sandberg's bluegrass, spiny hopsage *(Grayia spinosa)* and low forb diversity. The plant community type is generally confined to locations too dry for bluebunch wheatgrass on soil that is finer-textured than is typical for needle-and-thread.

Big Sagebrush/Sandberg's bluegrass-Cheatgrass: This community is primarily composed of Big sagebrush with an understory dominated by Sandberg's bluegrass mixed with cheatgrass. While they often commingle, *P. secunda* and *B. tectorum* are frequently ecologically-separated on a fine scale (Easterly, R. and D. Salstrom 2004.), with Sandberg's bluegrass dominant over cheatgrass in the slightly-depressed intershrub areas and other areas with specific microclimates with slightly-higher moisture (e.g., in specific micro-topographic areas).

Big Sagebrush/Cheatgrass: This community is primarily composed of big sagebrush with an understory dominated by cheatgrass.

Black Greasewood/Alkali saltgrass: This plant community is composed of greasewood *and* alkali saltgrass.

Winterfat/Sandberg's bluegrass: This plant community is primarily composed of winterfat *(Eurotia lanata*) and Sandberg's bluegrass. Overall species diversity is low; however they provide the structural habitat for the rare plant Piper's daisy (*Erigeron piperianus)* to grow with frequency.

Three-tip Sagebrush/Bluebunch wheatgrass: At the higher elevation of the ALE Reserve, three-tip sagebrush begins to co-occur with or replace big sagebrush as the dominant shrub with bluebunch wheatgrass as the primary understory graminoide species**.**

Riparian Complex: The riparian communities are characterized by diverse shrubs and trees that include a substantial component of willow species, cottonwood *(Populus sp.)*, quaking aspen, cattails, black elderberry *(Sambucus nigra* L.*)*, mock orange *(Philadelphus lewsii),* choke cherry (*Prunus virginiana*), and woodrose along with some native grasses. These areas can provide valuable wildlife habitat, especially for amphibians, birds and bats in an otherwise arid landscape.

Species diversity within each of the major community types has been altered in some areas due to the activities of neo-European people that entered the region beginning 200 years ago. In more recent history, alien plants were introduced and established a foot-hold in the shrub-steppe communities with the advent of livestock grazing in the mid-1800's and through agricultural cultivation and urbanization later in the century. Vegetation within this area has also been altered through the establishment of cheatgrass within sage communities and the resulting shortening of the natural fire return interval (Please see Areas of Greatest Invasive Grass Presence map - Appendix III). Historically, fire return intervals were between 50 to 100 years in the shrub-steppe region (Wishom et. al. 2000). Fires burned in a complex mosaic pattern across the landscape, leaving many healthy remnant stands of bunchgrass and sagebrush. These patterns allowed for the survival of healthy sagebrush communities and habitat for wildlife species before the invasion such noxious weeds as cheatgrass which out compete regeneration of native communities (USFWS 2007).

With the current vegetation structure, cheatgrass not only out competes native species but provides ladder and bridge fuels for fire to quickly spread into and throughout big sagebrush communities, creating larger more frequent fires that burn hotter depleting the shrub component of the shrub-steppe habitat. In addition, cheatgrass matures and dries out early in the year, creating bridge fuel for much of the spring and summer. This often results in fires that occur earlier than historically-recorded and before many native grass species have entered summer dormancy (USFWS 2007). Because there is limited time to store energy for next year's growth, these conditions create a more vulnerable disposition to mortality from fires.

Seven riparian zones can be found in spring fed areas that support significant stands of native willows, cattails, wood rose, aspen, choke cherry, mock orange and current. These areas can provide valuable wildlife habitat, especially for amphibians and crawfish, and feeding/nesting/perch sites for birds and bats in an otherwise arid landscape. Additionally, these vegetation resources can provide forage and cover for a variety of wildlife species, aesthetic values, watershed stability, and promote biologically diverse plant associations. The repeated burning of this area has added to the cumulative loss of trees and habitat structure within this riparian zone and replanting will be necessary.

2. Rare Plants

Emergency consultation was held with the U.S. Fish and Wildlife Service (USFWS) Ecological Services Office, Richland, Washington on August 29, 2007 for threatened and endangered (T&E) species known to occur within the Wautoma Fire area in Benton, County, Washington. Species lists were obtained using the following web based address: http://www.fws.gov/easternwashington/county%20species%20lists.htm.

References consulted included a current list of species considered by the U.S. Fish and Wildlife Service as Endangered, Threatened or as Species of Concern for the counties

in which the fire occurred and GIS data layers of known rare plants for the refuge. Plant species listed by the U.S. Fish and Wildlife Service that occur within Benton County and/or taxa considered Endangered, Threatened, or Sensitive in Washington (WNHP 2007) with known occurrences within the burned area are listed below; species known to occur within the area burned by the Wautoma Fire are in bold in the list (Please see Rare Plants map- Appendix III).

SPECIES	LISTING STATUS
Columbia milk-vetch (*Astragalus columbianus*)	FSC/SS
Stiff milk-vetch (*Astragalus conjunctus var. rickardii*)	NL (regional endemic)
Small flower evening primrose (*Camissonia minor*)	SS
Dwarf evening primrose (*Cammissonia pygmaea*)	SS
Snake River Cryptantha ***(Cryptantha spiculifera***)	SS
Piper's daisy (*Erigeron piperianus*)	SS
Hoover's desert-parsley (*Lomatium tuberosum*)	FSC/SS
Few-flowered purple mat (*Nama densum var. parviflorum*)	SW
Coyote tobacco (*Nicotiana attenuate*)	SS
Tufted evening primrose (*Oenothera caespitosa*)	SS

KEY TO LISTING STATUS:

E	FEDERAL ENDANGERED
T	FEDERAL THREATENED
C	FEDERAL CANDIDATE
FSC	FEDERAL SPECIES OF CONCERN
SC	STATE CANDIDATE
SE	STATE ENDANGERED
ST	STATE THREATENED
SS	STATE SENSITIVE
SW	STATE WATCH LIST
NL	NOT LISTED

The elimination of surrounding vegetation, the potential for invasion by non-native species, combined with erosion due to wind and precipitation over the winter months, may result in larger impacts to this species than are currently-anticipated. Further, fire rehabilitation plans may call for use of herbicides, reseeding efforts, or other management actions that may influence the population of these species (USFWS 2007). Habitats for the plants listed below were 97 to 100 percent burned during the Wautoma Fire. Annual surveys for the next several years should be conducted in appropriate habitats to evaluate impacts from the fire on these rare plants.

Columbia milk-vetch (*Astragalus columbianus*) is associated with deep sandy loams and gravelly loams in the shrub-steppe vegetation zone at an elevation range of 500 to 2,100 feet. Low-intensity fires are known to increase numbers of this plant, with a

historic fire frequency of approximately 30 to 40 years within its habitat. Columbia milk-vetch finds eroded areas suitable for colonization, however, will not expand in number in these disturbed areas.

Stiff milk-vetch *(Astragalus conjunctus var. rickardii)*, a relatively common milkvetch on the north-facing slopes and summit of Rattlesnake Mountain, has been determined to be a new variety. For many years prior to this determination, it was mistakenly referred to as the variety reventiformis (Yakima milkvetch). On the Monument, the milkvetch is scattered in bunchgrass areas along the main ridges of Rattlesnake Mountain where the population includes several tens of thousands of plants. However, the population remains incompletely mapped. The two known locations of the plant are both in Benton County—the large population on Rattlesnake Mountain and a small population in the Chandler Butte portion of the Horse Heaven Hills. The Monument's population is entirely included within the boundaries of the ALE where it benefits from very limited access and low disturbance levels. Maintenance of public ownership and the current management regime are the most likely methods to ensure the long-term survival and viability of this plant. Basalt milk-vetch's relatively mesic, high elevation habitats support plant communities that appear to be somewhat resilient following fire, and which exhibit lower levels of invasion by non-native species than shrub steppe communities at lower elevations.

Small flower evening primrose (*Camissonia minor*) is associated with gravelly basalts, sandy soils, and cryptogamic crusts in the shrub-steppe vegetation zone at elevations ranges of 460 to 1,140 feet. Negative impacts of the burn on this species are expected, but unknown.

Dwarf evening primrose (*Cammissonia pygmaea*) is found on unstable soil or gravel in steep talus, dry washes, banks and roadcuts. The taxon occurs in habitats that are maintained in an open condition by erosion and the generally harsh environment. Because of the unstable nature of the habitat and the annual habit of the taxon, it is probable that the number, size and location of the populations vary from year to year. There are few known sites of the species in Washington, many of which are small in size. Negative impacts of the burn on this species are expected, but unknown. The plants are emergent and identifiable from June through August; therefore, the fire burned during the appropriate season to impact this plant this growing season and next growing season because the plant may not have reached the mature seeding stage at the time of the fire.

Snake River cryptantha *(**Cryptantha spiculifera),*** is regionally endemic, known from central Washington and eastern Oregon to northeastern California and northern Nevada, east through the Snake River Plains of Idaho, and western Montana. In Washington, the taxon has been found in the Okanogan Highlands, Eastern Cascades and Columbia Basin physiographic provinces. The taxon occurs on dry, open, flat or sloping areas in stable or stony soils. Occurs where overall cover of vegetation is relatively low. Based on the species' choice of habitats, it probably does not tolerate direct competition with other herbs or is not able to endure the shade of shrubs or

trees. Its ability to grow and reproduce in a relatively harsh environment enables the taxon to colonize areas where others species may not survive (Higgins 1971). Agricultural conversion, grazing, ORV use, and irrigation related groundwater changes are all threats to the species. Identified in Hitchcock et al. (1959) as a synonym for *Cryptantha interrupta* (Greene) Pays. However, the taxa are now treated as distinct, with *Cryptantha spiculifera* occurring in Washington, but not *Cryptantha interrupta*. Due to the lack of species specific information regarding Snake River cryptantha response or relationship to fire, two species of cryptantha were used as a possible indicator of how *C. spiculifera* would respond to a burn event. According to the Craters on the Moon National Monument's Wildfire Management Plan, *Cryptantha spp.* may increase greatly in the years following a fire until perennials dominate the burned site. Also, Cohn states that "native fire followers, such as *Cryptantha micromeres*, were predominant in the first 14 months after a burn. Both of these species accounts would indicate that *C. spiculifera* could possibly benefit from a fire event, at least temporarily. Due to its rare status though, one could assume that a fire would be detrimental to the long-term success of the species.

Piper's daisy (*Erigeron piperianus*) is most common in undisturbed areas of the sagebrush steppe. This daisy occurs in dry, open places, often with sagebrush. It grows on level ground to moderate slopes of all aspects at elevations ranging from 400 to 2,250 feet. The soil is typically well drained, and is generally somewhat alkaline. It occurs most commonly in the big sagebrush/bluebunch wheatgrass plant community. Species response to periodic fires is not known. Recent information on Piper's daisy response to fire was gathered following the 24 Command fire of 2000. Post-wildfire monitoring from 2000 to 2004 on the ALE within the Monument suggested that the abundance of Piper's daisy decreased following a large wildfire but gradually recovered over several (3 to 4 years) to pre-fire levels (TNC 2005). This information, however, was generated in an area that is relatively undisturbed and was able to regenerate post-fire with little other disturbance.

Hoover's desert parsley (*Lomatium tuberosum*) occurs only on loose talus habitats, typically on east to north facing slopes of 45 to 60 degrees, associated with basalt outcroppings and sparse vegetation. This species occurs within the shrub-steppe vegetation zone at elevations of 600 to 2,300 feet. Negative impacts of the burn on this species are expected, but unknown.

Few-flowered purple mat (*Nama densum var. parviflorum*) occurs in sandy soils within the shrub-steppe vegetation zone. Negative impacts of the burn on this species are expected, but unknown.

Coyote tobacco (*Nicotiana attenuata*) occurs in dry, sandy bottom lands, dry rocky washes, and in other dry open places at elevation ranges from 400 to 10,000 feet. The species occurs in areas that receive periodic natural disturbances. Due to the amount of disturbance to its habitat, both natural and human-caused, *N. attenuata* is associated with several aggressive exotic species that have invaded the habitat and presumably compete for resources. This, combined with the relatively large number of historical

collections of the taxon in Washington and the few currently known sites, suggests that the species may be in decline in the state. Negative impacts of the burn on this species are expected but unknown.

Tufted evening primrose (*Oenothera caespitosa*) occurs on road cuts, dry hills, arid and rocky slopes in open and wooded areas, and in desert regions. This plant is very diverse ecologically throughout its range, occurring on a variety of substrates, including limestone, volcanic cinders, sandstone, shales, and gypsum, and in a variety of vegetation types, including juniper woodlands (mainly), Arizona chaparral, conifer forests, sagebrush scrub, and grasslands. Negative impacts of the burn on this species are expected, but unknown.

In addition to the species listed above, there is potential for other species considered to be rare in Washington to occur in the area burned in the Overlook Fire. This includes species not known to occur in the State at the time the rare plant inventories were conducted, such as the ephemeral annuals spreading pygmyleaf (*Loeflingia squarrosa* var. *squarrosa)* and rosy pussypaws *(Calyptridium roseum)*. Over the course of the field survey no evidence of native plant survival had been noted. Seeds from these plants remain in the soil seed bank and will germinate and proliferate. While this may be true, noxious weeds and invasive plants have an evolutionary growth advantage of putting down roots quickly and before most natives and will most likely result in loss of habitat for native and rare species in the freshly burned area.

3. Vegetation/Structural Impacts

Vegetation resources were directly impacted by the Wautoma Fire and by suppression tactics utilized to control the fire. Documented impacts to vegetation resulted from:

- Potential for invasion by aggressive non-native species throughout the disturbed site.
- Total damage to 29 established post-disturbance planting areas in the Monument (Please see Command 24 Sample BAER Hand Planting Areas map, Appendix III).
- Construction of 113.21 miles/25.6 acres (based on 16 foot width) of dozer line and disk-line on previously undisturbed sites.

- Impacts to native shrub and grass species during line construction, suppression and mop-up activities
- Reduction of fuels and vegetation ahead of the fire-front (backfire operations).
- Vegetation losses and microbiotic crust loss due to fire intensity. Most sagebrush and grassland communities were completely consumed and/or scorched. Some additional loss is expected within the remaining shrub communities. Loss of riparian structure and understory shrubs in and around riparian areas.
- Loss of the organic litter layer on approximately 90 percent of the fire area.

Most sagebrush, bunchgrass, and cheatgrass communities experienced greater than 90

to 95 percent vegetation loss of above-ground cover. It was observed that approximately 90 percent of the Wautoma Fire area completely consumed all vegetation resources. In areas with high cheatgrass invasion there was extreme fire intensity were the ground was very black indicating that the shrub, grass, forb species and organic material on the soil surface had high impact from the Wautoma Fire possibly having a negative impact on the soil seed bank. Seedings should be done in these areas to reduce the risk of soil erosion from wind and runoff from precipitation.

In the 10 percent areas that observed as low fire impact within the shrub-steppe vegetation loss of shrubs is still predicted to occur due to mortality from heat produced by the fire and seasonally-dry weather conditions.

The riparian areas experienced a burn with varying intensities. Occasional flare-ups were recorded into the tree canopy and destroyed the limited aspen tree stand completely at Mid-Snively Springs. However, generally moderate intensity burning occurred in the understory, with some smoldering and low-intensity burning in areas with running water. Some emergent vegetation was only partially burned, incompletely burned or merely scorched. Mimicking the Command 24 fire, the Wautoma Fire damaged Snively Springs and Rattlesnake Springs which experienced a 75 to 100 percent loss of riparian vegetation in and around the spring sources and along the stream channel. Potentially, grazing or trampling impacts will occur within riparian areas due to the loss of the forage base for wildlife species, causing streambank degradation. The estimated vegetation mortality in other riparian areas is between 80 to 99 percent.

Most of the forb species were consumed. Although the fire burned at varying intensities across the landscape, in most cases the residency time (i.e. the time that fuel particle remains flaming) of the fire was short enough to preclude damage the soil to an extreme, existing root systems of bunchgrasses, or only slightly reduce native seed banks in the known habitats of these plants. Burying of native seeds through wind deposition of soils or the remobilization of soil and seed bank to downwind dune settings now threatens the natural regeneration of native species in large portions of the sandy soil types (USFWS 2007).

Negative impacts resulting from vegetation losses include potential for increased non-native species invasion, bare or windblown soils, significant reduction in wildlife habitat, forage for wildlife species, and potential for increased non-native and reduced species diversity. The loss of wildlife habitat and potential impacts to Threatened and Endangered Species are discussed further within the Wildlife Assessment (USFWS 2007).

Ground disturbing impacts to Monument property resulted from and disks, and equipment driving off road during suppression efforts. A complete inventory was conducted of disked lines and dozerlines on the fire area and emergency stabilization needs assessed (Please see Fire Suppression map- Appendix III). More information can be found in the Watershed and Soils section of this report.

The role of microbiotic crusts (MBC) in shrub-steppe ecosystems is still incompletely understood (Evans and Lih 2005) and estimating the magnitude and extent of MBC damage from the Wautoma Fire is a complex task that is beyond the scope of BAER field survey and assessment. Therefore, this assessment can make no definitive conclusions about the condition and location of the MBC and the emergency stabilization measures recommended reflect this finding.

D. Vegetation Recovery

Revegetation of the fire area through natural processes will take between 7 and 30 years to visually-represent pre-fire conditions. However, due to the presence of non-native plants and noxious weeds, the site is at risk of becoming dominated by non-native annuals, such as cheatgrass, kochia (*Kochia scoparia*), and aggressive perennial species such as rush skeletonweed (*Chondrilla juncea*), perennial pepperweed (*Lepidium latifolium*), russian knapweed (*Acroptilon repens*), diffuse knapweed (*Centaurea diffusa)*, and puncture vine (*Tribulus terrestris*). Without active restoration, it is unlikely that the site will recover to its pre-fire characteristics (USFWS 2007). Some impacted plant communities will take decades to re-establish back to pre-fire levels and some may be permanently altered. Big sagebrush (A. t. ssp. wyomingensis) is the most xeric of the big sagebrush community types and is the most susceptible to invasion of noxious weeds such as cheatgrass. These communities are more likely to be converted to annual grasslands with increased fire frequency (FEIS 2007). A “no action” plan would have negative consequences on the regeneration of this habitat. For example, most research indicates that fire eliminates spiny hopsage permanently, and sagebrush and bitterbrush for at least several years. Because native plants such as big sagebrush do not sprout after fire and bitterbrush rarely sprouts in the ALE, recovery can be very prolonged on this site. Of particular concern are the re-establishment of critical sagebrush communities for agency listed T&E wildlife habitat and the protection of the ecological integrity of the shrub-steppe community (USFWS 2007). Natural regeneration of riparian zones with willows and sedges can take up to 3 to 5 years and immediate stabilization is needed to protect streambanks.

1. Noxious Weed Establishment

Invasive alien plant species pose one of the most serious threats to the native biodiversity, wildlife habitat, and scenic values which the Hanford Reach National Monument was declared to protect, and for which the entire Hanford Site is well known (Soll et al. 1999). At Hanford, and elsewhere in western North America, invasive and noxious alien plant species compete against and reduce habitat available for rare plant taxa and native plant species in general. Weeds alter ecosystem structure and function, disrupt food chains and other ecosystem characteristics vital to wildlife (including rare and endangered species), and can dramatically alter key ecosystem processes such as hydrology, productivity, nutrient cycling, and fire regime. (USFWS 2007)

Conditions created by wildfire favor the spread of many noxious weed species (Evans et

all 2003). The fire presents a large-scale disturbance and created new open sites vulnerable to weed invasion. This creates a fertile bed for the rapid colonization and spread of non-native species, especially coupled with the added nutrients from the ash. Thus, invasive species and noxious weeds which compete with the recovery native vegetation are likely become established and/or spread within the burned area. (Please see Areas of Greatest Invasive Grass Presence map- Appendix III)

Control of weed species known on the Monument was prioritized in the Weed Inventory and Management Plan (2003), based on the following criteria: aggressiveness, level/size of infestation, degree of ecological threat or impact, value of habitat surrounding weed infestations, and effectiveness of available control technologies. Priority 1 species that pose the greatest threat and require immediate control. Priority 2 species do not spread quite as rapidly as Priority 1 species, but are still of great concern. Priority 3 species are all other invasive species that are perceived as slightly less likely to threaten Monument resources, but are still of concern. (Evans 2003)

During post-fire reconnaissance and field assessment, wildlife biologists recorded sightings of any non-native or invasive species. In addition, known infestations of invasive species of concern that are located within and near the burned area and their priority for control are listed in the following table. Several of these species are located within the fire area, and others are very near to the fire area (Please see Invasive Weeds map- Appendix III). (USFWS 2007)

Species	Priority for control
Downy Brome *(Bromus tectorum)*	NL
Diffuse knapweed (*Centaurea diffusa)*	1
Rush skeletonweed (*Chondrilla juncea*)	1
Puncturevine (*Tribulus terrestris*)	1
Russian knapweed (*Acroptilon repens*)	2
Whitetop (*Cardaria draba*)	2
Canada thistle (*Centaurea solstitialis*)	2
Kochia (*Kochia scoparia*)	3
Perennial pepperweed (*Lepidium latifolium*)	3
Common reed (*Phragmites australis*)	3

All of these non-native plants and noxious weeds spread vigorously and pose significant threats in the burned area. It is therefore imperative to treat known populations prior to seed-set in order to reduce the expansion potentials of these populations into the burned area; immediate treatment is highly recommended through spray and reseeding methods.

Inventories for targeted invasive plant species throughout the Monument have been conducted on only 30,000 acres (>12000 ha) of the 195,000 acre Monument. These inventories were focused on areas where noxious weeds had been previously reported, on special habitats (e.g., natural springs) where certain target species are expected to

occur, and in disturbed lands and dispersal corridors (Evans 2003). Thus, not all of the Monument lands have been surveyed for noxious weeds and some key areas likely to harbor priority invasive species have NOT yet been inventoried. For example, riparian and aquatic habitats were only partially surveyed, and invasive species there are undoubtedly substantially underreported in the current Monument database. Thus, the burned area is likely to have undocumented occurrences of noxious weeds, and immediate, thorough surveys of the area are important to prevent their unchecked expansion. (USFWS 2007)

Another validation for immediate control of noxious weed and invasive plant infestation is the agriculture land near the perimeter of the Monument. The deleterious effects of invasive plant species are not limited to natural areas but may also severely impact local economies. Invasive weeds compete with agricultural crops for light, moisture, and nutrients, clog irrigation systems, and reduce livestock forage values in pastures and rangelands. Degradation of agricultural lands resulting from invasive species may drastically reduce land values. (Evans 2003)

Chemical treatment methods should be used within the fire area to achieve prioritized weed control objectives immediately followed by reseeding or drill seeding with Mix 1 or Mix 2 depending on the area. Treatment methodologies should be based upon the best information available from weed management literature and professional experience and tailored to the characteristics of the particular species and site.

Evans and Lih (2005) conclusions support the recommended Wautoma Fire ES measures over natural recovery:

- Careful management… and a long term commitment to integrated and adaptive approaches to invasive species management, fire management and restoration practives will be required to successfully manage the ALE Reserve and other shrub-steppe ecosystems in the coming years.
- Aggressive management activity to control cheatgrass and to enhance the recovery of natural structure and function of sagebrush shrubland stands will be critical to the long-term ecological integrity of these habitats.
- The problem of cheatgrass must be addressed in relation to native plant community health and fire management practices. There are no simple answers; no permanent solution to the problem of cheatgrass control is currently available and management is extremely challenging.

2. Revegetation

There are several reason revegetation is essential at this site. The Wautoma Fire burned significant acreage of native habitat that is at high risk of invasion from non-native species and noxious weeds. To protect the plant community and ecology of the site revegetation is critical. The Fire also destroyed critical riparian communities, creating unstable stream banks with high erosion potential that can affect public health and irreparable damage if not corrected in a timely fashion by revegetation.

Additionally, revegetation in the area should be conducted to protect soils and to reduce the amount of dust and protect the plant community and ecology of the site. As stated above, it is unlikely that the fire area will recover without some intervention and active restoration effort.

Concern has been expressed over the loss of vegetation cover in wind-blown areas of the Wautoma Fire area. Wind-blown soils present a hazard to residents to the east of the burn and to drivers along SR 240 and the Hanford Nuclear Reservation. The windblown areas may take years to stabilize. Stabilization and re-vegetation of large portions of those areas is needed to ensure ecological function and to protect public safety along the road ways. (Please see Wind Erosion Risk map- Appendix III).

Application of herbicide and planting of native seeds (including aerial seeding) to restore areas before invasive species become established is well supported by recent research (Bakker & Wilson, 2004:1058-1064) (Huddleston & Young 2005:507-515) (Thompson & Rounding, 2006) (Seabloom & Harpole 2003). In addition, Evans and Lih state that the rates of grass seedling emergence and recruitment from aerial seeding efforts observed (in their 2005 study) are probably typical of broadcast seeding efforts in the arid West. This infers that aerial seeding is a typical broadcast seeding practice in similar areas of the Western U.S.

IV. RECOMMENDATIONS

A. Fire Suppression Stabilization:

Suppression account -Dozer/Disk line Rehabilitation- Drill-seed all disturbed areas resulting from suppression actions with native seed species to protect the ecological integrity of the area. Seeding will be postponed until fall or until such time as adequate moisture provides a firm seedbed for stabilization actions and native seed availability.

B. Emergency Stabilization: (specification related)

- The following recommendations are offered to stabilize soil to prevent loss or degradation of productivity by seeding to prevent establishment of invasive plants, and direct treatment of invasive plants and by using integrated pest management techniques to minimize the establishment of non-native invasive species within the burned area.

    1) *Non-Native Invasive Species Control*: Herbicide Spray followed with Native Plant Seeding- Apply herbicide spray to significantly reduce invasive weed spread and diminish threats in areas of concern from noxious weeds and non-native species. Spray should not be applied during high wind storms. Follow the spray with aerial and drill seeding of native plants Mix 1 and Mix 2 in the fall to establish prolific native colonies and minimize invasive weed infestation into non-infested areas. Seeding methods should follow weather patterns to determine times of appropriate seeding considering expected moisture and wind. (Please see Treatment Areas of Aerial Spraying map and Treatment Areas of Native Seeding

map- Appendix III). It should be noted that drill and aerial seeding are being recommended in a small percentage of the burn area.

2) *Riparian Ecological Stabilization*: Native Grass Seeding- Apply native seed mix to burned riparian areas to stabilize the stream bank and prevent invasion by noxious weeds and non-native species. This stabilization measure will stabilize soils and reduce downslope sedimentation that may degrade sagebrush steppe habitat. When appropriate given terrain and soils, drill-seeding is preferred, based upon the discovery of hydrophobic soils in the Snively Creek riparian zone and in areas of high wind. Areas with extreme wind potential should be hydromulched.

3) *Effectiveness Monitoring*: Monitor non-native invasive species growth and native plant seedings in first year following treatment to determine success of revegetation efforts and to determine if additional treatments are required to protect and maintain the ecological integrity of the site.

C. Rehabilitation (non-specification related treatments)

- Submit long-term rehabilitation plan as required to stabilize soils, control non-native invasive species and protect ecological integrity of the site.

D. Management Recommendations (non-specification related)

- Coordinate emergency stabilization needs with the Department of Energy and The Washington Department of Transportation to ensure public safety is protected along county roads and SR 240. A meeting of USFWS and ODOE staff was conducted on August 29, 2007 to coordinate anticipated emergency stabilization activities including dust control.
- Monitoring: Invasive Plant Species- Develop monitoring protocols and conduct field inventories on disturbed sites including but not limited to dozerlines, handlines, safety zones, and initiate control measures on invasive species infestations that threaten native plant community recovery as discovered.

V. CONSULTATIONS

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VI. REFERENCES

Easterly, R. and D. Salstrom. 2004. Current vegetation map of Saddle Mountain, Wahluke and Ringold Units, Hanford Reach National Monument. SEE botanical consulting, Report to the U.S. Fish and Wildlife Service.

Evans, J. R., J.J. Nugent, and J. K. Meisel. 2003. Invasive Plant Species Inventory and Management Plan for the Hanford Reach National Monument. Report to U.S. Fish and Wildlife Service, The Nature Conservancy of Washington, Seattle, Washington.

The Nature Conservancy of Washington. 2005. Recovery and Rehabilitation of Vegetation on the Fitzner-Eberhardt Arid Lands Ecology Reserve, Hanford Reach National Monument, Following the 24 Command Fire. Final Report: 2001 – 2004.

The Nature Conservancy of Washington. 1999. Biodiversity Inventory and Analysis of the Hanford Site. Final Report. 1994-1999.

The Nature Conservancy of Washington. 1995. Annual Report. Biodiversity Inventory and Analysis of the Hanford Site.

Washington State Department of Natural Resources, 2000. Field Guide to Washington's Rare Plants.

Fire Effects Information System (FEIS)- National Interagency Fire Center Web Site. http://www.fs.fed.us/database/feis/plants/weed/weedpage.html. (Accessed September 8, 2007)

Clinton, W. June 8, 2000**.** Proclamation 7319 - Establishment of the Hanford Reach National Monument. (Accessed September 7, 2007) http://www.presidency.ucsb.edu/ws/index.php?pid=62329

National Wildlife Refuge System Improvement Act of 1997.

USFWS. Fire Management Handbook. Emergency Fire Rehabilitation Standards.

Joel G. Peterson. 1995. Ecological Implications of Sagebrush Manipulation.

C.A. Brandt et al. 1999. Plant Reestablishment After Soil Disturbance: Effects on Soil, Treatment, and Time.

Steven O. Link et al. 1990. Response of a Shrub-Steppe Ecosystem to Fire: Soil Water and Vegetational Change.

Wishom, M. L. et al. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin :broad-scale trends and management implications. Gen. Tech. Rep. PNW-GTR-485. Portland, OR. U.S. Department of Agriculture,

Forest Service, Pacific Northwest Research Station. 3 vol. (Quigley, T.M. Tech. Ed.; Interior Columbia Basin Ecosystem Management Project: scientific assessment).

Higgins, L.C. 1971. A revision of *Cryptantha* subgenus *Oreocarya*. Brigham Young University Science Bulletin. Volume XIII (4): 1-63.

Hitchcock, C. L., A. Cronquist, M. Ownbey, and J.W. Thompson. 1959. *Vascular Plants of the Pacific Northwest, Part 4: Ericaceae Through Campanulaceae*. University of Washington Press, Seattle. 510 pp.

Clinton, W. June 8, 2000**.** Proclamation 7319 - Establishment of the Hanford Reach National Monument. (Accessed September 7, 2007) http://www.presidency.ucsb.edu/ws/index.php?pid=62329

USFWS. August 22, 2007. Vegetation and Soil Damage Assessment. Burned Area Emergency Stabilization Plan Overlook Fire.

U.S. Fish and Wildlife Services. 2007. Overlook Fire. Burned Area Emergency Rehabilitation (BAR). US Fish and Wildlife Service BAER Team, Hanford Reach National Monument, Richland, Wa.

U.S. Fish and Wildlife Services. 2000. 24 Command Fire. Burned Area Emergency Rehabilitation (BAR). Prepared by the Northern States Burned Area Emergency Rehabilitation Team.

Smith, D. July 7, 2000. Vegetation and Soil Damage Assessment. Burned Area Emergency Stabilization Plan Command 24 Fire. Pg. 92

USFWS. 2006. Hanford Wildlife Monument. Draft Comprehensive Conservation Plan & EIS. Page 2-42.

USFWS. Native Grassland and Shrub-Steppe. Hanford Reach National Monument, Saddle Mountain National Wildlife Refuge. (Accessed September 7, 2007) http://www.fws.gov/hanfordreach/grasslands.html

Weed Control and Soil Amendment Effects on Restoration Plantings in Oregon Grassland. Russell T. Huddleston and Truman P. Young, 2005

Using Ecological Restoration to Constrain Biological Invasion. Jonathon D. Baker and Scott D. Wilson, 2004.

Fire Rehabilitation Using Native and Introduced Species: A Landscape Trial. Tyler W. Thompson, Bruce A. Roundy, E. Durant McArthur, Brad D. Jessop, Blair Waldron, and James N. Davis, May, 2006.

Invasion, Competitive Dominance, and Resource Use by Exotic and Native California Grassland Species. David Tilman, September 2003.

Effects of Cheatgrass Control on Wyoming Big Sagebrush in Southeastern Utah, Daniel B. Eddington, December 2006

Soll et al. 1999

Bakker and Wilson, 2004:1058-1064

Thompson and Rounding, 2006

Seabloom and Harpole, 2003

Evans and Lih, 2005

Rebecca Z. Meyer, Soil Scientist- FSE/Shaw 800.447.3558 and Heidi USFWS Wildlife Biologist, USFWS 509.371.1801

BURNED AREA EMERGENCY STABILIZATION PLAN
WAUTOMA FIRE
WILDLIFE RESOURCE DAMAGE ASSESSMENT

I. OBJECTIVES

- Assess effects of fire and suppression actions to 1) Federal species with special status [species listed as endangered, threatened, proposed, candidates or species of concern under the Endangered Species Act (ESA)]; 2) State species of concern [species listed as endangered, threatened, sensitive or candidates by the Washington Department of Fish and Wildlife (WDFW)]; and 3) species of Tribal Importance. This assessment covers birds, mammals, amphibians, reptiles, fish, insects and their habitat.
- Assess effects of fire and suppression action to habitat improvements.
- Assess effects of proposed emergency stabilization actions to covered species and habitat.
- Initiate Emergency Section 7 Consultation with the US Fish and Wildlife Service (USFWS) and NOAA's National Marine Fisheries Service (NMFS), if required by the ESA.

II. ISSUES

- 16 agency (State and/or Federal) listed wildlife species occur within the fire area, most of which are dependent on the shrub-steppe plant community.
- Potential effects to these species from the fire, suppression actions and potential post fire effects to shrub-steppe obligate species.
- Potential effects to these species from proposed emergency stabilization actions.

III. OBSERVATIONS

A. Background

The purpose of this Burn Area Emergency Stabilization (ES) Wildlife Assessment is to assess the effects of the Wautoma Fire, suppression actions, proposed emergency stabilization work, and potential post fire erosion, to all Federally-listed, State-listed, agency-sensitive, and culturally-significant species and their habitats which may be directly or indirectly affected by the fire. This assessment also includes documentation of Emergency Section 7 Consultation, if required by the ESA, with U.S. Fish and Wildlife Service and NMFS. The species list is included in Appendix IV of this report. The species list for the fire area was developed with the assistance of Heidi Newsome and Kevin Goldie of the U.S. Fish and Wildlife Service, Hanford Reach National Monument (the Monument)/Saddle Mountain NWR (SMNWR). Species presence is based on formal surveys and habitat inventories conducted on Arid Lands Ecological Reserve (ALE) lands prior to the Wautoma Fire, and post fire reconnaissance. Documents, inventory data, sighting records, vegetation maps and other species specific information used in this report are on file at the Monument office.

The Monument was created on June 9, 2000. At that time, President Clinton directed the U.S. Fish and Wildlife Service to manage the Monument to protect all of the species associated with the shrub-steppe ecosystem. Included in the Memorandum of Understanding between U.S. Fish and Wildlife Service and DOE for management of the Monument, the primary objective of the U.S. Fish and Wildlife Service is to ensure that the Monument is operated and managed for the protection and preservation of the native shrub-steppe habitat and its associated wildlife species. The Federal agencies are also responsible for managing species of importance to the Native American Tribes.

The Monument is located in the Pacific Flyway. Habitats within the fire area serve as nesting and resting areas for many species of migratory birds. The Monument includes habitat for many wildlife species, including 44 mammals, 258 birds, 5 amphibians, 12 reptiles, 49 butterfly taxa, 318 species of moths, and 151 taxa of aquatic macroinvertebrates (HRNM/SMNWR 2006). Species diversity on the Monument can be attributed to the size, diversity, and relatively undisturbed condition of the native shrub-steppe habitat and the proximity of the free-flowing Columbia River.

B. Reconnaissance Methodology

Information used in this assessment is based on a review of relevant literature, agency management planning documents, agency wildlife sighting and habitat inventory data, communication with U.S. Fish and Wildlife Service, and reconnaissance of the fire area on August 28, 2007. The BAER team reconnaissance figure shows the locations where field assessments occurred on August 28. Habitat information and mapping for the various species is based on agency records and post fire reconnaissance. Reconnaissance and analysis included review of BAER Plans from a 2000 fire [24 Command Fire, (USFWS 2000)] that encompassed the Wautoma Fire to assess effects to species and vegetative recovery. Representative photos taken of burned areas during the August 28th, 2007 reconnaissance are located in Appendix IV.

C. Findings

To better understand the species and habitat information discussed in this wildlife assessment, it is important to review the Wautoma Fire ES Vegetation and Watershed/Soil Resource Assessments. Those chapters contain more detailed descriptions of pre-fire vegetation, post-fire vegetative, and soil stabilization measures, and effects to the watersheds.

The purpose of this assessment is to discuss the potential effects of the fire, suppression actions and proposed emergency stabilization activities to Federally-listed, State-listed, and sensitive species which occur within the fire area (USFWS 2000). Effects to wildlife species without special Federal or State status are not discussed. This assessment is not intended to definitively answer the many questions about effects to specific species that are inevitably raised during an incident such as the Wautoma Fire. Rather, the focus of this assessment is to identify immediate, emergency actions that may be necessary to prevent further effects to these species. Because the species discussed in this assessment have ranges or territories which extend beyond the fire

area, the assessment includes information at a larger scale that crosses land ownership boundaries for species which may require assessment for long-term rehabilitation or restoration (USFWS 2000).

BIOLOGICAL EVALUATION

Direct effects as described in this report refer to mortality or disturbances that result in flushing, displacement, or harassment of the subject animal. Indirect effects refer to modification of habitat and/or effects to prey species.

SHRUB-STEPPE DEPENDENT WILDLIFE SPECIES

The community of plants and animals found in this area represents one of the largest remaining examples of the shrub-steppe ecosystem that once covered the Columbia River Basin (USFWS 2000). Termed a biological treasure, the Monument contains rare, rich and diverse shrub steppe ecosystem flora and fauna that have been lost elsewhere due to habitat conversion, fragmentation, and application of pesticides. The shrub-steppe ecosystem supports an unusually-high diversity of native plant and animal species, including significant breeding populations of nearly all steppe and shrub-steppe dependent wildlife native to the area, and provides rare and unique habitat that is critical for meeting U.S. Fish and Wildlife Service regional, national, and ecosystem goals and objectives. This area serves a critical role in contributing to the local, regional, national, and international ecological integrity of the shrub-steppe ecosystem (USFWS 2000).

While fire has played an integral role in the history of the shrub-steppe environment, the region's historical fire regime has been greatly altered by socio-political and economic factors (USFWS 2000). Coupled with the arrival of invasive species and noxious weeds, these mechanisms have weakened the natural recovery processes of the shrub steppe ecosystem from disturbance events such as fire. Managing for biological integrity in this area necessitates that actions be taken to mitigate the ecological effects increasing fire frequency and intensity, and invasion of exotic species (USFWS 2000).

The Wautoma Fire severely damaged plant communities that survived the 24 Command Fire or were planted following the 24 Command Fire. Furthermore, fire suppression activities (establishment of a disk/blade line primarily on the fire perimeter) impacted approximately 25.6 acres of habitat. Notably, the fire destroyed a contiguous patch of big sagebrush mosaic on the northwest section of ALE lands totaling approximately 4,289 acres. In addition, 10,539 acres of threetip sagebrush mosaic, 34,775 acres of bunchgrass, and 44 acres of riparian vegetation were destroyed. The Wautoma Fire also burned areas where big sagebrush, rabbitbrush, bitterbrush, and other species of native vegetation were planted following the 2000 fire. In total, the Wautoma Fire effectively eliminated more than 4,289 acres of big sagebrush mosaics in varying stages of succession.

Sagebrush is a food source and/or provides nesting, resting, thermal, and escape cover for a wide variety of species. Other value for wildlife includes the thick canopy which protects understory vegetation that can be a valuable food source for wildlife (USFWS

2000). Wildlife species recorded in the fire area that are dependent on the sagebrush shrub-steppe and have special Federal/State-listing status or Tribal importance include: ferruginous hawk, burrowing owl, golden eagle, loggerhead shrike, sage sparrow, sage thrasher, western sage grouse, Townsend's ground squirrel, Merriam's shrew, pygmy rabbit, black tailed jack-rabbit, white-tailed jack rabbit, elk, mule deer, sagebrush lizard, and striped whipsnake. In addition to mule deer, wildlife species in the fire area that depend on properly-functioning riparian vegetation include long-eared myotis and Townsend's big-eared bat; these are Federal and State species of concern, respectively. This riparian vegetation, however, had been previously altered by elk browsing since the 24 Command Fire.

CUMULATIVE FIRE IMPACTS ON THE HANFORD REACH NATIONAL MONUMENT:
The 24 Command Fire wildlife assessment follows several other assessments conducted because of large wildfires within the Monument area. These fires encompassed formerly burned areas that have not had time to regenerate to the point of supporting some species that depend on mature sagebrush. The cumulative effect of many large fires over a short time frame within the Monument area has exacerbated the impact to shrub-steppe dependent wildlife (see section on Cumulative Impacts of Fire on HRNM in Executive Summary).

Wildlife Species of Concern:

Overlook Fire Species List
On August 20, 2007, an inventory of currently-listed or special status Federal species that could potentially occur in Benton County was obtained from U.S. Fish and Wildlife Service, Ecological Services Field Office in Wenatchee, Washington (http://www.fws.gov/easternwashington/county%20species%20lists.htm). Concurrently, an up-to-date list of similar species likely to occur in the Columbia River Basin and under the jurisdiction of NMFS was obtained (http://www.nwr.noaa.gov/ESA-Salmon-Listings). From this broad inventory, a list of species more specific to the Wautoma fire area and adjacent lands was created after consultation with Heidi Newsome and Kevin Goldie of the U.S. Fish and Wildlife Service on 29 August 2007.

The following species list summarizes all wildlife species under the jurisdiction of the Monument that could have been affected by the Wautoma Fire, suppression efforts, and post-fire stabilization measures. For plant species of concern see the Vegetation Assessment.

SPECIES	LISTING STATUS
Ferruginous hawk, *Buteo regalis*	FSC/ST
Golden eagle, *Aquila chrysaetos*	SC
Loggerhead shrike, *Lanius ludovicianus*	FSC/SC
Sage sparrow, *Amphispiza belli*	FSC/SC
Sage thrasher, *Oreoscoptes montanus*	FSC/SC
Greater sage grouse, *Centrocercus urophasianus*	C/ST

Burrowing owl, *Athene cunicularia*	FSC/SC
Merriam's shrew, *Sorex merriami*	SC
Townsend's ground squirrel, *Spermophilus townsendii townsendii*	SC
Pygmy rabbit, *Brachylagus idahoensis*	E/SE
Black-tailed jackrabbit, *Lepus californicus*	SC
White-tailed jackrabbit, *Lepus townsendii*	SC
Long-eared myotis, *Myotis evotis*	FSC
Townsend's big-eared bat, *Corynorhinus townsendii*	SC
Sagebrush lizard, *Sceloporus graciosus*	FSC/SC
Striped whipsnake, *Masticophis taeniatus*	SC
Elk, *Cervus elaphus*	TI
Mule deer, *Odocoileus hemionus*	TI

The following list of species was identified as occurring or having habitat within Benton County. Through post-fire reconnaissance and consultation with local experts, it was determined that these species were likely not affected by the fire because they have no habitat within or adjacent to the fire area, and/or inventories prior to the fire determined absence, the fire area is outside of the species range or season of use, or the species is migratory through the area affected by the fire. Therefore, the following species will not be covered in great detail in the balance of the assessment.

Upper Columbia River Spring Chinook Salmon, (*Onchorynchus tshawytscha*)	E/SC
Middle Columbia River Steelhead, (*Onchorynchus mykiss)*	T/SC
Upper Columbia River Steelhead, (*Onchorynchus mykiss)*	E/SC
Bull trout, *(Salvelinus confluentus) Columbia River distinct population segment*	T/SC
California floater mussel, *(Anodonta californiensis)*	FSC/SC
Giant Columbia spire snail, *(Fluminicola columbiana*)	FSC/SC
Bald eagle, (*Haliaeetus leucocephalus*)	FM/ST
Peregrine falcon, (*Falco peregrinus*)	FSC/SS
Northern goshawk, *(Accipiter gentiles)*	FSC/SC
Sandhill crane, (*Grus canadensis*)	SE
Great blue heron, (*Ardea herodias*)	TI
Lewis' woodpecker, (*Melanerpes lewis*)	SC
Yellow-billed cuckoo, (*Coccyzus americanus*)	C/SC
Pallid Townsend's big-eared bat, (*Corynorhinus townsendii pallescens)*	FSC/SC
Pacific lamprey, (*Lampetra tridentata*)	FSC
Redband trout, (Oncorhynchus mykiss)	FSC
River lamprey, (*Lampetra ayresi*)	FSC
Western brook lamprey, (*Lampetra richardsoni*)	FSC
Margined sculpin, (*Cottus marginatus*)	FSC/SS
Columbia clubtail dragonfly (*Gomphus lynnae*)	FSC

KEY TO LISTING STATUS:

E	FEDERAL ENDANGERED
T	FEDERAL THREATENED
C	FEDERAL CANDIDATE
FSC	FEDERAL SPECIES OF CONCERN
FM	FEDERAL MONITOR
SC	STATE CANDIDATE
SE	STATE ENDANGERED
ST	STATE THREATENED
SS	STATE SENSITIVE
TI	TRIBAL IMPORTANCE

FERRUGINOUS HAWK

Ferruginous hawks are a Federal species of concern, a Federal Migratory bird of Conservation Concern (USFWS 2002), and a State-Threatened species. Ferruginous hawks are migratory raptors that occur on the Monument during the breeding season from early March through August (USFWS 2000). The incubation period is 28 to 33 days with fledging at 44 to 48 days from the date the egg is laid. There are seven historical nests within the Wautoma burn area in steep exposed basalt canyons associated with Rattlesnake Mountain (see Wildlife Species of Concern Map). Additional nests are located on Rattlesnake Mountain, but outside the burn perimeter. Ferruginous hawks forage widely both on the site and in surrounding areas. The fire area is well within the foraging area for these active nesting territories. It should be noted, however, that nesting raptors are not monitored every year on the Monument, and historic nest locations may be re-used in later years. Ferruginous hawks do demonstrate nest site fidelity, returning to the same nesting territories in subsequent years. The fact that some territories within and adjacent to the fire area were not used during this season does not mean they would not be viable in future years. Many territories in Eastern Washington are unoccupied due to the current decline in the population of ferruginous hawks in Washington. Available nesting territories are not currently thought to be limiting the population and, if the population rebounds, currently unoccupied areas may become occupied (Watson 2003). Ferruginous hawks are sensitive to human presence, and will abandon their nests if subject to human encroachment. Activities (especially those that are noisy) near nesting sites should be limited during the breeding and fledging season (USFWS 2000).

Ferruginous hawks prey on a variety of mammals, birds, reptiles and insects, depending upon local area and prey abundance. These hawks may forage up to 15 km (approximately 9 miles) from their nest site; however, nest success may be greater in areas where abundant forage is in close proximity to the nest location. Areas where prey densities are high generally have greater successful nesting attempts. The average home range size of ferruginous hawk in Washington may be as large as 7,660 acres (31 sq. km = 11 sq. miles), based on hawks traveling considerable distances to forage (WDFW 1996).

FIRE IMPACTS: The entire 51, 356 acres of the Wautoma Fire can be considered ferruginous hawk habitat. This loss is combined with cumulative losses due to repeated fires on the Monument area (see section on Cumulative Impacts of Fire on HRNM in Executive Summary). Because the fire occurred in mid-August, ferruginous hawks were likely present during the fire. Of the seven historical nest sites, it is uncertain how many were active just prior to the fire. Adults and fledglings that were present during the fire are considered to be mobile and capable of escaping the affected area. Nest sites are located on steep cliffs and far removed from sources of fuel, so nest sites were probably not damaged by the fire. Young likely fledged prior to the fire. Fire suppression activities, nor the noise from such operations, did not affect ferruginous hawks because nest sites are located in remote areas inaccessible to disk/blade lining.

Other impacts to ferruginous hawks from the Wautoma Fire and suppression activity are indirect and include a reduction of habitat diversity that supports prey for ferruginous hawks, reduction of habitat for foraging and nesting ferruginous hawks, and reduced potential for this historic nesting area to be re-occupied in future years. WDFW considers the ferruginous hawk a priority species for management and recognizes that they benefit from land-use practices that ensure an adequate prey base. WDFW recommends that landowners/managers should protect shrub-steppe and grassland habitats that harbor significant populations of small mammals and other prey (Richardson et. al. 2004). Further, WDFW recommends reseeding of native plant species after chaining or burning to promote habitat stability and to benefit ferruginous hawk prey populations (Richardson et al. 2004, Olendorff 1993). Therefore, stabilization and rehabilitation of the habitat lost in the Wautoma fire in and around nest locations is essential, to support an abundance of prey species, and to develop critical foraging and nesting habitat for the ferruginous hawk. Stabilization and rehabilitation of suitable habitat around nest sites is likely critical for the recovery of this species in Washington.

LOGGERHEAD SHRIKE

Loggerhead shrikes are a Federal species of concern, listed as a Migratory bird of Conservation Concern (USFWS 2002), and are a State Candidate for listing as a threatened species. The loggerhead shrike is a neo-tropical migrant species that breeds on the Monument. During the breeding season, there were documented sightings of shrike in the fire area within remaining big sagebrush habitat on the northwest section of ALE lands (see Loggerhead Shrike Habitat and Wildlife Species of Concern Maps).

Loggerhead shrikes are common on the Hanford site from early March until the end of August (USFWS 2000). After August numbers are reduced but individuals have been sited through early November. Loggerhead shrikes require mature sagebrush, or other shrubs, for breeding and foraging habitat. Shrikes are most abundant in habitats of relatively high horizontal and vertical structural diversity (Poole 1992). This species builds its nests within shrubs, and requires some sort of shrub or other habitat feature when foraging for and impaling its prey. The species is well known for its unusual and complex behavior of impaling prey on sharp objects in conspicuous places or wedging prey in narrow V-shaped forks (Yosef 1996). The primary prey items of this species are

insects (e.g., beetles, and grasshoppers), although small mammals, small birds, and lizards are also taken as prey (Yosef 1996). Loggerhead shrikes are highly territorial, and they exhibit a high level of nest site/territory fidelity. Poole (1992) found that shrikes defended territories averaging 34.4 acres (±4.9 ac) on the Hanford Site in Washington. Also on the Hanford Site, of 113 territories studied, 96 percent were reoccupied the following season (Poole 1992). Shrikes remain in breeding territories as fledglings for 3 to 4 weeks after leaving the nest. This post-fledging period is the time of highest mortality for shrikes, when young birds are weak fliers and are vulnerable to predation (Poole 1992).

The loggerhead shrike is one of the few North American passerines whose populations have declined continent wide in recent decades (Yosef 1996), and in Washington Breeding Bird Survey data for the Columbia River Basin shows a significant decline in the shrike population over the last 26 years (Vander Haegen 2004). Burning and wildfires may create the greatest risk to local shrike populations because the damage is immediate and habitat regeneration to pre-burn condition may take up to 30 years (Harniss and Murray 1973).

FIRE IMPACTS: Loggerhead shrikes were likely present during the fire. Adults and fledglings that were present during the fire, however, are mobile enough to escape harm from the fire and suppression measures. The 4,289 acres of shrub-steppe habitat that was burned in the Wautoma fire was used by loggerhead shrike (see Vegetation map – Sagebrush cover Appendix III). This loss is combined with cumulative losses due to repeated fires on the Monument area (see section on Cumulative Impacts of Fire on HRNM in Executive Summary). Impacts from the Wautoma Fire to the shrikes are indirect and include loss of prey base, loss of habitat for nesting and foraging, and loss of structural diversity of habitat required for shrike use of the area. Because shrikes exhibit fidelity to nesting territories, individuals that attempt to return to former territories in subsequent breeding seasons will find them void of nesting cover and structure. Additionally, displacement of individual breeding pairs into other areas may increase inter- and intraspecific competition for nesting territories. If suitable habitat areas are already occupied by breeding pairs, displaced pairs may not be able to locate territories, or will be forced to utilize marginal habitat types. Breeding success would likely decline for pairs that have been displaced by fire impacts to their breeding habitat. Individual loggerhead shrikes were observed during post-fire reconnaissance.

WDFW considers the shrike a priority species for management and provides the following management recommendations for loggerhead shrike habitat: retain shrub-steppe communities, especially big sagebrush and mixed shrub communities; avoid wildfires and activities that may increase invasion by exotic vegetation; and avoid management activities that increase cheatgrass (*Bromus tectorum*) invasion or increase risk of wildfire (Vander Haegen 2004, Leu and Manuwal 1996). Stabilization and rehabilitation of the habitat within the fire area is critical for Monument management of this declining species.

SAGE SPARROW

Sage sparrows are a Federal Migratory bird of conservation concern (USFWS 2002), and a State candidate for listing as a threatened species. Sage sparrows are a migratory sparrow present in the Columbia Basin during the breeding season from early February until the end of September (USFWS 2000). Sage sparrows prefer semi-open habitat with evenly spaced shrubs 1-2 meters high (Martin and Carlson 1998). This species is associated with sagebrush throughout its range. Sage sparrows forage on the ground for seeds and invertebrates. On the Monument/SMNWR, sage sparrows are abundant in areas that retain big sagebrush communities. The Hanford Site, along with the Yakima Training Center to the west, supports the largest contiguous habitat patches in Washington. Exceptional habitats with apparent high densities of sage Sparrows are found in big sagebrush stands along the base of the Saddle Mountains, throughout sagebrush habitats on the Columbia River plains, and within Central Hanford. Sage sparrows are confirmed breeders on the site, and they frequently raise more than one brood per season. They are territorial and exhibit site fidelity to nesting territories. Flocks of juveniles are frequently observed along roadsides from late May throughout the beginning of August (USFWS 2000).

FIRE IMPACTS: Sage sparrow was present during the Wautoma Fire. Adults and juveniles, however, are mobile enough to escape the fire and suppression actions. The 4,289 acres of shrub-steppe habitat that was burned in the Wautoma Fire was used by sage sparrow (see Sage Sparrow Habitat and Wildlife Species of Concern Maps). This loss is combined with cumulative losses due to repeated fires on the Monument area. Adult sage sparrows had probably initiated their third nesting effort; these nests were probably destroyed by the fire. Although sage sparrows are mobile animals, their individual behavioral site fidelity to their nesting territories may have increased their susceptibility to direct loss during the fire. Large flocks of juvenile sage sparrows are generally observed during this time period. These recently fledged birds may have been displaced due to the fire. The big sagebrush vegetation within the burn area experienced mortality of 100 percent. Therefore, virtually the entire available sage sparrow habitat in the fire area was lost as a result of the fire. Due to the loss of shrub cover, surviving adult birds with established territories will return to find nesting and foraging habitat in a highly altered habitat condition (USFWS 2000). These birds were most likely displaced due to the fire. Because sage sparrows exhibit fidelity to nesting territories, individuals that attempt to return to former territories in subsequent breeding seasons will find them void of nesting cover and structure. Additionally, displacement of individual breeding pairs into other areas may increase inter- and intraspecific competition for nesting territories. If suitable habitat areas were already occupied by breeding pairs, displaced pairs may not be able to locate territories, or will be forced to utilize marginal habitat types. Breeding success would likely decline for pairs that have been displaced by impacts to their breeding habitat from the fire (USFWS 2000).

The increasing frequency and intensity of range fires in Great Basin pose significant threat to native grasses and shrubs. Historically, fires were infrequent, and perennial grasses and shrubs were not adversely affected. With increased fire frequency, native plants are killed and seed reservoirs of grasses and shrubs are depleted and replaced

with exotic annuals, such as cheatgrass. Sage sparrows abandon former habitats once invaded by cheatgrass (Martin and Carlson 1998). Thus, replacement of native vegetation by cheatgrass in areas disturbed by the fire will decrease the available habitat for sage sparrows. Because sage sparrows require open areas and bare ground for foraging, changes in vegetation structure and loss of sagebrush due to the fire will impact foraging by sage sparrows. Stabilization and rehabilitation of this area to prevent the spread of cheatgrass and to replace lost shrub habitat is essential to maintain this area for sage sparrows.

SAGE THRASHER

A Washington State candidate species, the sage thrasher is found on the Monument primarily in patches of big sagebrush and three-tip sagebrush (USFWS 2000). Sage thrashers are a neotropical migratory bird species present on the Monument in low numbers from early April through September. The sage thrasher is a species that is highly-dependent on healthy shrub-steppe communities comprised of tall, dense sagebrush (*Artemisia* spp*.).* Sage thrashers are closely associated with sagebrush and are considered obligates of sagebrush communities (Vander Hagen 2003).

In order to maintain sage thrasher populations, shrub-steppe communities should be left in reasonably undisturbed condition and fragmentation should be minimized. Management activities that increase cheatgrass invasion or increase risk of wildfire also must be avoided (Vander Hagen 2003). Burning may lead to serious negative impacts to local sage thrasher populations because the damage is immediate and habitat regeneration to pre-burn condition may take up to 30 years (Harniss and Murray 1973).

FIRE IMPACTS: Sage thrashers are mobile animals and would have been able to move out of the fire area and avoid impact from fire suppression activities. Remaining dense sagebrush areas on ALE lands provided sage thrasher habitat. The Wautoma Fire burned a total of 14,828 acres of big/three-tip sagebrush habitat (see Sage Thrasher Habitat and Wildlife Species of Concern Maps). This loss is combined with cumulative losses of sagebrush habitat due to repeated fires on Monument lands. The elimination of sagebrush within the fire area will have long-term impacts for sage thrashers (USFWS 2000). All available habitat within the burned area (mature sagebrush) was impacted by the fire. Long term effects will include displacement of sage thrashers from the burn area. It is anticipated that this species will not return until the sagebrush recovers to maturity and provides the necessary habitat structure to support sage thrashers. It is unknown if potential re-colonizing populations exist in patches of big sagebrush habitat adjacent to the burn area (USFWS 2000).

GREATER SAGE GROUSE

Greater sage grouse are listed as a State-threatened and the Columbia Basin distinct population segment is a candidate for Federal listing as threatened. Two small, disjunct remnant populations of sage grouse occur in Washington (USFWS 2000). One population is in Douglas County, approximately 75 miles north of Hanford, and the second is on the Army's Yakima Training Center (YTC) in Yakima and Kittitas Counties, just northwest of the Hanford Site. The Douglas County population is estimated at

approximately 600 individuals and the YTC population at approximately 200 individuals. As recently as 1999, the YTC population appears to have begun to expand into that portion of the Monument included in the ALE Unit. Several sage grouse sightings were made in 1999 and 2000 in the vicinity of Rattlesnake Springs and Benson Ranch (USFWS 2000). However, no more recent sightings have been recorded (see Wildlife Species of Concern Map).

Greater sage grouse nesting habitat in southeastern Washington is primarily sagebrush-steppe vegetation that is of relatively high-quality (dominated by native species). Sagebrush intermixed with tall bunch grasses provides cover required for successful nesting (USFWS 2000). Brood rearing habitat includes the shrubs and tall grasses for escape cover, but also must include a mix of native forbs that provide both insect (prey) habitat and high protein vegetation. Sagebrush is an essential element for sage grouse during the late fall, winter and early spring, when the leaves of sagebrush make up as much as 99 percent of the birds' diet (USFWS 2000).

An interagency working group was established in 1998 to assist with the recovery of the sage grouse in Washington (USFWS 2000). Several agencies (U.S. Army, USFWS, the WDFW, the U.S. Department of Energy, and the Yakama Nation) are working to preserve and restore sage grouse in eastern Washington State. It is noteworthy that the Hanford Site property (Monument area) was identified as one of the few large land areas having contiguous and high-quality habitat suitable for sage grouse recovery and expansion (USFWS 2000).

FIRE IMPACTS: Because no sage grouse were apparently present during the fire, only indirect impacts occurred. Indirect impacts from fire and fire suppression were loss of habitat (nesting habitat, winter and summer shelter habitat, escape cover losses and food resources lost). Recovery of sage grouse habitat in this area will probably take many years. In addition, the forbs and invertebrates which are the preferred food for this species were effectively eliminated throughout most of the fire area. Although lost habitat would probably only support a small sage grouse population, this recent fire, when combined with several other large fires on the Monument area over the past seven years, has impacted over 100,000 acres of potential grouse habitat on the Monument (see section on Cumulative Impacts of Fire on HRNM in Executive Summary). The cumulative impact from these fires on the habitat condition for sage grouse cannot be over-stated. This cumulative habitat loss may delay or prohibit recovery of the western sage grouse in the State of Washington.

Due to the significant amount of habitat cumulatively lost, and because any remaining sagebrush on ALE lands does not occur in the large blocks apparently needed for survival, it is expected that this area will not support sage grouse for 30 or more years (USFWS 2000). The arid nature of the site may further delay recovery because germination and growth of shrub species depends upon amount and timing of available moisture.

BURROWING OWL

Western burrowing owls are a Federal species of concern, a Migratory bird of Conservation Concern (USFWS 2002), a State candidate species, and a State priority species. There are some currently active burrows within the fire area and approximately 20 historic burrows within the Wautoma Fire perimeter. In addition, several records exist of burrowing owl presence within and adjacent to the fire area (see Wildlife Species of Concern Map). Several patches of ALE land serve as potential habitat for burrowing owls because the denning and foraging activity of larger mammals has created burrows of suitable size for the owl.

Burrowing owls are small ground-dwelling species associated with dry, open, short grass, or desert and are often linked with burrowing mammals (USFWS 2000). Foraging areas are typically short grass dominated habitats; food items include predominately invertebrates and small mammals, and occasionally small birds and reptiles. Within the Columbia Basin, Western burrowing owls are primarily migratory and are present from February through early August, although a few individuals over-winter. The Western burrowing owl is thought to be declining throughout central Washington and much of its range in North America. It is also apparently declining at the Hanford Site. Once thought relatively common, burrowing owls are now rarely observed. The regional decline of ground squirrels, which provide nesting sites for these owls, is possibly linked with the apparent decline in owl populations. The potential decline in population is not unique to the Monument and may be characteristic of the species population trend throughout eastern Washington (USFWS 2000). Loss and degradation of habitat throughout the Columbia Basin from a variety of factors, including wildfire, has likely contributed to the decline of this species.

FIRE IMPACTS: Given the mid-August timing of the Wautoma Fire, it is possible that some adult or juvenile burrowing owls were directly affected by the fire. Although burrowing owls are mobile and can fly, their habit is to run and/or hop along the ground (USFWS 2000). During the breeding cycle, the owls are tied to their nest burrow locations and retreat to the burrow for protection from avian predators. If present, burrowing owls may have been killed during the fire due to this behavior. Seeking refuge within the burrow may have exposed individual owls to extreme heat and/or asphyxiation by smoke. More probable impacts to burrowing owls from the Wautoma Fire and suppression measures are indirect and include; impacts to invertebrate and small mammal prey populations, a reduction of habitat diversity that supports prey for burrowing owls, and reduction of habitat for foraging burrowing owls. The elimination of shrubs effectively reduces almost all natural perch locations for burrowing owls. Shrubs are also important to burrowing owls as thermal cover, adults and juvenile owls seek thermal cover in the shade of shrubs during mid-day periods. Further, elimination of shrub cover may expose small mammals to higher predation rates and consequently may reduce the local abundance of small mammals. Burrowing owls are also prey for other raptor species. Reduced plant biomass, and loss of cover could result in a higher predation rate on individual burrowing owls within the burn area (USFWS 2000). Loss of approximately 34,775 acres of bunchgrass mosaic, in addition to the removal of small native shrubs from the landscape, will impact burrowing owls. Due to repeated fires on

the Monument area, the Wautoma Fire loss is combined with cumulative losses (see section on Cumulative Impacts of Fire on HRNM in Executive Summary). Clearly, stabilization of the grassland and shrubland habitat on ALE lands that supports burrowing owls will make this area more viable as burrowing owl habitat in the future. Without stabilization and rehabilitation, it is unlikely that burrowing owls would use this area in the future.

GOLDEN EAGLE

The golden eagle is a State candidate species. Golden eagles have been observed in the fire area in the past and are considered to be a year round, uncommon species. There are no records of nest sites in the burned area (USFWS 2000).

FIRE EFFECTS: If golden eagles were present during the fire, they would have been temporarily displaced due to the fire and suppression actions, including use of helicopters and airplanes (USFWS 2000). Potential nest structures (basalt cliffs with little surrounding fuel) were probably unaffected by the fire. Prey species that were dependent on the shrub-steppe plant community were greatly reduced. However, remaining prey species will have less vegetation to use for hiding cover; therefore hunting for prey items may be easier for golden eagles in the short-term. Carrion may also be more available in the short term (USFWS 2000).

TOWNSEND'S GROUND SQUIRREL

Townsend's ground squirrel, a State candidate species, has been observed in the area burned by the Wautoma Fire. The Townsend's ground squirrel has recently been recognized as a species that only occurs in Washington (http:www.washingtonedu/burkemuseum/collections/mammalogy). It forms large colonies and groups are restricted to the area north of the Yakima River and west and south of the Columbia River. It prefers arid desert with open sagebrush and grassland habitats, but is also found associated with greasewood. Several colonies within the Wautoma Fire have been inventoried as recently as 2006 (see Wildlife Species of Concern Map). The Townsend's ground squirrel is gray-colored, with no spots, and a short tail that is reddish below. In June or July, aestivation begins and continues until winter hibernation. The species breeds soon after hibernation ends in late January to early February and young are born by mid-March. Townsend's ground squirrel forage on sagebrush flats and eat seeds and green plant parts-often climbing bushes to reach them. Adults dig two burrows, the larger of which serves as the home burrow. The home burrow can be at least 50 feet long and up to 6 feet deep (http:www.washingtonedu/burkemuseum/collections/mammalogy). This species is often preyed upon by badger. Approximately 49,903 acres within the fire area were potential habitat for Townsend's ground squirrel based on the presence of big sagebrush, three-tip sagebrush, bunchgrass, and greasewood prior to the Wautoma Fire.

FIRE IMPACTS: Any Townsend's ground squirrels present in the burned area would have been hibernating during the fire. However, depending upon heat and fire intensity, animals may have suffered mortality within their burrows. The fire and suppression activity removed shrubs, which indirectly impacts Townsend's ground squirrels because they require such habitat for hiding cover as well as protection from predation. Further,

the potential conversion of native bunch grass areas to annual grasses (cheatgrass) will impact the habitat for Townsend's ground squirrels.

Regionally, the loss of 49,903 acres of potential Townsend's ground squirrel habitat represents a significant decrease of suitable habitat for this species. The cumulative loss, however, due to repeated fires on the Monument area is even more substantial (see section on Cumulative Impacts of Fire on HRNM in Executive Summary). The habitat loss on ALE lands may delay or prohibit recovery of the Townsend's ground squirrel in Washington. Thousands of acres of potential habitat exist on ALE lands if the areas could be stabilized.

COLUMBIA BASIN PYGMY RABBIT

The Columbia Basin pygmy rabbit was emergency-listed as a Federally endangered species in November of 2001. This species is extremely rare in Washington, occurring only in the Great Basin portion of the Lower Columbia Basin (USFWS 2000). Prior to 1984, a small population was recorded with the burn area on Rattlesnake Mountain above Snively Springs (see Wildlife Species of Concern Map). The pygmy rabbit is limited to habitat types which contain tall dense sagebrush and specific soils with limited content of sand for constructing its burrows. Field observations of the pygmy rabbit indicate heavy reliance on sagebrush, primarily on the seed heads and vegetative leaders. Pygmy rabbit diet is comprised of 99 percent sagebrush in winter and 51 percent in summer (USFWS 2000).

FIRE IMPACTS: Because they were not present on ALE lands during the Wautoma Fire, no direct impacts to pygmy rabbit occurred. Prior to the fire, ALE lands supported approximately 4,289 acres of potential habitat for Columbia Basin pygmy rabbit. The stabilization of sagebrush cover in this area is critical to developing potential habitat and reintroduction areas for pygmy rabbit. This area may be important for the eventual recovery of pygmy rabbit in Washington. Combined with cumulative losses, habitat lost in the Wautoma Fire represents a significant decrease of suitable habitat for this species (see section on Cumulative Impacts of Fire on HRNM in Executive Summary). Continued habitat loss or delayed recovery of suitable habitat may prohibit recovery of the pygmy rabbit in Washington.

PROPOSED EMERGENCY STABILIZATION IMPACTS: Emergency stabilization measures proposed for riparian areas, dust abatement, and invasive species control on ALE lands burned in the Wautoma Fire will not adversely affect pygmy rabbits or suitable habitat. In fact, pygmy rabbits may benefit from such stabilization measures in the long-term.

MERRIAM'S SHREW

Merriam's shrew is a State candidate species. It prefers dry habitats and is generally found in sagebrush and grasslands of Western North America (USFWS 2000). On the Hanford site, this species has been documented to occur in association with three-tip sagebrush at the higher elevations on the ALE. The Merriam's shrew uses burrows created by the sagebrush vole and other burrowing mammals. The diet of this shrew

includes caterpillars, beetles, crickets, and wasps. Shrews have exceedingly high metabolism and must feed frequently both day and night. Shrews are generally solitary, except for short periods during the breeding season (spring). Shrews are preyed upon by owls, snakes, and some mammals (USFWS 2000).

FIRE IMPACTS: The Merriam's shrew was probably present within the affected area and thus directly affected by the Wautoma Fire. Because of its subterranean habit, it may have been protected by being under ground during the fire. Alternatively, this animal may have been killed through heat and/or asphyxiation by smoke. Due to the dramatic expected loss of invertebrate prey within the burn area, the Merriam shrew was indirectly impacted by the fire. Because of the metabolic needs of the Merriam's shrew, and its need to forage nearly constantly, it is possible that many of these animals died shortly after the fire due to a lack of prey to meet energetic demands. Insects found within the ground would still be readily available, and insects above ground will quickly repopulate the burned area. Species abundance likely changed from pre-fire conditions.

BLACK-TAILED JACK RABBIT

Black-tailed is a State candidate species. The species has been recorded on lands burned by the Wautoma Fire (see Wildlife Species of Concern Map). The black-tailed jackrabbit was once abundant throughout the Columbia Basin (USFWS 2000). Recent precipitous declines in populations of these hares have raised concerns regarding their distribution and status throughout the region. This species is closely-associated with the sagebrush-steppe ecosystem. Black-tailed jackrabbits rely on sagebrush structure for breeding sites and hiding cover, and require sagebrush vegetation as forage during winter months. Black-tailed jackrabbits breed from late February to mid-July, with gestation lasting 41 to 47 days (Flinders and Chapman 2003). They can have two to six litters per year, with local populations likely tending towards the low end of this scale (Flinders and Chapman 2003). Hares, unlike rabbits, do not use burrows. They place their young in shallow depressions in the soil called *forms*. Jackrabbits are generally solitary and primarily nocturnal. They are vulnerable to predators including, coyotes, bobcats, foxes, hawks, owls, and snakes. Loss of habitat due to agricultural and human development has impacted jackrabbit populations. The fragmentation and isolation of populations residing within remnant habitat areas has probably increased their vulnerability to stochastic events (e.g. severe weather, disease, fire, etc.) and has limited the re-colonization of areas that could potentially support jackrabbit populations (USFWS 2000).

FIRE IMPACTS: No direct impacts to the black-tailed jackrabbit resulted from the fire. Black-tailed jackrabbits are known to be relatively fast moving animals. Because these animals are highly-mobile, at the time of the fire it is anticipated that adults and the season's juveniles would have been swift enough to avoid the fire and suppression activity. Black-tailed jackrabbits are primarily nocturnal and some individuals were observed during fire suppression operations. Some indirect impact occurred due to loss of remaining sagebrush habitat. Being a very mobile species, the entire 51,356 acres of the Wautoma Fire is considered black-tailed jackrabbit habitat. Notably, the loss of

14,828 acres of sagebrush structure (big and three-tip sagebrush) and cover reduces the amount of hiding cover for this species, and will increase the vulnerability of jackrabbits to predation. Additionally, the loss of a significant continuous stands of sagebrush exacerbates this effect, because smaller patches do not provide escape cover. If jackrabbits are chased out of the remaining small patches of cover, they will be forced into the open burned over areas and be easily captured and consumed. Impacts to the local jackrabbit population will also affect those animals that prey on jackrabbits, as jackrabbit numbers decrease there will be less forage for other animals that prey upon jackrabbits. Two black-tailed jackrabbits have been observed using a small patch of sagebrush remaining from the 24 Command Fire. It appeared that these individuals were seeking cover within the unburned portions of the fire area (USFWS 2000).

When combined with cumulative losses from repeated fires on the Monument area, habitat lost in the Wautoma Fire represents a large impact to black-tailed jackrabbits and may impact their continued persistence within the Monument area (see section on Cumulative Impacts of Fire on HRNM in Executive Summary). Stabilization and rehabilitation is critical to maintaining viable habitat on the Monument for this species.

WHITE-TAILED JACK RABBIT

White-tailed is a State candidate species. Recent sightings of this species within the Wautoma Burn area have been recorded (see Wildlife Species of Concern Map). This species is closely-associated with the sagebrush steppe ecosystem. White-tailed jackrabbits rely on sagebrush structure for breeding sites and hiding cover, and require sagebrush as forage during winter months. White-tailed jackrabbits breed from late April to September (http:www.washingtonedu/burkemuseum/collections/mammalogy). Often solitary, they come together in small groups to breed. They can have up to 4 litters per year, but Washington populations are at the northern part of their range, where one is the more common litter frequency. Hares, unlike rabbits, do not use burrows. They place their young in shallow depressions in the soil called *forms*. Jackrabbits are generally solitary and primarily nocturnal. They are vulnerable to predators including, coyotes, bobcats, foxes, hawks, owls, and snakes. Loss of habitat due to agricultural and human development has impacted jackrabbit populations. The fragmentation and isolation of populations residing within remnant habitat areas has probably increased their vulnerability to stochastic events (e.g. severe weather, disease, fire, etc.) and has limited the re-colonization of areas that could potentially support jackrabbit populations.

FIRE IMPACTS: White-tailed jack rabbits experienced no direct impacts from the Wautoma Fire. White-tailed jackrabbits are known to be relatively fast moving animals. Because these animals are highly mobile, it is anticipated that adults and the season's juveniles at the time of the fire would have been swift enough to avoid the fire and suppression measures. White-tailed jackrabbits are primarily nocturnal, but one individual was observed during the day at the margin of the burned area during post-fire reconnaissance on 28 August 2007. Some indirect impact occurred due to loss of remaining sagebrush habitat. Due to its large size and mobility, the entire 51,356 acres affected by the Wautoma Fire is potential white-tailed jackrabbit habitat. Notably, the loss of 14,828 acres of sagebrush structure (big and three-tip sagebrush) and cover

reduces the amount of hiding cover for this species, and will increase the vulnerability of jackrabbits to predation. Additionally, the loss of a significant continuous stands of sagebrush exacerbates this effect, because smaller patches do not provide escape cover. If jackrabbits are chased out of the remaining small patches of cover, they will be forced into the open burned over areas and be easily captured and consumed. Impacts to the local jackrabbit population will also affect those animals that prey on jackrabbits, as jackrabbit numbers decrease there will be less forage for other animals that prey upon jackrabbits.

When combined with cumulative losses from repeated fires on the Monument area, the habitat lost due to the Wautoma Fire represents a large impact to white-tailed jackrabbits (see section on Cumulative Impacts of Fire on HRNM in Executive Summary). The indirect impacts from the Wautoma Fire may depress their population within the Monument area. Stabilization and rehabilitation is critical to maintaining viable habitat on the Monument for this species.

LONG-EARED MYOTIS

Long-eared myotis is a Federal species of concern. This bat species is actually found in a wide range of habitats from arid grasslands to moist coastal forests (USFWS 2007). This species is a generalist in its eating habits; it feeds heavily on small moths, but also eats flies, beetles, and other insects. During the day, long-eared myotis may roost under bark, in rock crevices and hollow trees. The females will form small maternity colonies and seem to prefer buildings during this time. It has been noted that occasionally a male will join the colony. But in general, little is known about the behavior, biology, and the specific location or type of preferred roost sites of this species. There is no information on hibernation sites for long-eared myotis. Long-eared myotis appears to be widespread throughout the western States, but not abundant. Lack of adequate information on both behavior and populations of this species have prompted its special Federal status (USFWS 2007).

FIRE IMACTS: Direct impacts to long-eared myotis from the Wautoma Fire and fire suppression are discountable. The heat from the Wautoma Fire would have alerted roosting bats, allowing them vacate their positions and avoid the fire. However, the loss of 44 acres of riparian vegetation along Snively Creek likely impacted the bats due to the decrease in available roost sites. Long-eared myotis also prefer riparian areas for foraging, so the fire likely depressed foraging success for bats that may feed on ALE lands.

TOWNSEND'S WESTERN BIG-EARED BAT

Townsend's western big-eared bat (Townsend's bat) is a Federal species of concern and State candidate species. The species occurs statewide where there is suitable habitat. Suitable habitat in eastern Washington includes shrub-steppe and riparian wetlands (Johnson and Cassidy 1997; WDFW 2005). Townsend's bats prefer to eat moths, but consume a variety of insects when available. Townsend's bats can forage in most natural habitat, so the availability of roost sites, which they use during daylight, seems to influence its distribution (Woodruff and Ferguson 2005). Townsend's bats use caves, mines, and hollow trees for roosting (WDFW 2005). Because aquatic areas are

a good source of insect prey, roost sites in riparian areas in arid lands may be especially valuable. During summer, females roost in communal maternity colonies, while males roost alone or in small groups. Cavities in snags and large trees may be important roost sites for males of this species (WDFW 2005). Townsend's bats are believed to regularly survey their environment for new roost sites because they have been found to use alternate roosts (Woodruff and Ferguson 2005). Potential roost sites on ALE lands include rock crevices and small caves on Rattlesnake Mountain and large trees in riparian areas. In Washington, the few known hibernacula are mostly in caves and mines (WDFW 2005). Since cavities of this volume probably do not exist on ALE lands, it is doubtful that bats hibernated in burned areas. Lack of information about behavior and populations of this species in Washington has led to its special State and Federal status.

FIRE IMACTS: Direct impacts to the Townsend's bat from the Wautoma Fire and fire suppression are unlikely. The heat from the Wautoma Fire would have alerted roosting bats, allowing them vacate their positions to avoid the fire. Townsend's bats were indirectly affected by the Wautoma Fire in terms of habitat loss. Due to the burning of riparian habitat and trees around Snively Creek, habitat for the Townsend's bat was likely impacted by the decrease in available roost sites.

SAGEBRUSH LIZARD

The sagebrush lizard is a Federal species of concern and a State candidate species. Sagebrush lizards emerge from hibernation in April (USFWS 2007). Mating occurs in April and May, and females lay their eggs in June, burying them in loose soils at the base of a shrub. Hatching normally occurs in August (Storm and Leonard 1995). Recent research in Oregon suggests that the sagebrush lizards are limited to habitats that have sandy soils. In Washington, all recently-confirmed sites are associated with sand dunes or other sandy habitats (Hallock and McAllister 2005). Approximately 3630 acres of the fire area qualifies as habitat for the sagebrush lizard, based on the presence of soils within the burn area that are classified as sand (see Soils Map). WDFW recommends that any activities that alter these habitats, such as conversion to agriculture and/or activities that promote the invasion of cheatgrass, are likely detrimental to sagebrush lizard populations (Hallock and McAllister 2005). Therefore, preventing post-fire encroachment by cheatgrass is important in maintaining the habitat for sagebrush lizards within the fire area. Stabilization of the fire area with native grass species will be important for management of this species (USFWS 2007).

FIRE IMPACTS: Sagebrush lizards were probably directly impact by the Wautoma Fire and suppression measures. Lizards may have been lost in the fire because they seek shelter within shrubs. Shrubs have longer fire residency times and burn hotter than surrounding grasses, and therefore lizards likely experienced direct mortality. Disk/blade lines established to contain the fire may also have killed lizards. Sagebrush lizards likely experienced indirect impacts as well. The 3,630 acres of patchy sandy upland shrub-steppe habitat within the perimeter of the Wautoma Fire is potential sagebrush lizard habitat (see Soils map). This loss is additional to cumulative habitat losses due to repeated fires on the Monument area (see section on Cumulative Impacts

of Fire on HRNM in Executive Summary). Those adult lizards that survived the burn are probably now exposed to predation, as removal of the shrubs would remove any hiding cover (USFWS 2007). Increased post-fire predation by avian and other predators is expected, which will reduce the population of sagebrush lizards in the fire area. Because little detail is known about the life history and habitat requirements of this species, protecting the lizard's habitat (based on the few known requirements) is important to managing for the population on ALE lands. Preventing the post-fire invasion of cheatgrass is also essential for maintaining the population of sagebrush lizards within the fire area (USFWS 2007).

STRIPED WHIPSNAKE: The striped whipsnake is a State candidate species. The species occurs in the Columbia Basin of Central Washington (USFWS 2007). The striped whipsnake is a long slender snake that is dark above, with alternating light and dark stripes down the length of the body. Adults range in size from 90 to 180 cm total length. This species is rare throughout most of its range in Washington. Striped whipsnakes have been documented in Washington only 26 times. In the last decade, only 3 observations have been reported (USFWS 2007). One whipsnake sighting was recorded on ALE lands on the northern edge of the burn (see Wildlife Species of Concern Map). This species occurs in low elevation (1,985 feet) arid regions with scattered vegetation, and open rocky areas (USFWS 2007). They require shrubs for cover and rock crevices or rodent burrows for egg laying and hibernation (Nordstron and Whalen 1997). Mating occurs in the spring, with eggs being deposited in June, and hatching in the late summer or early fall. This species has been documented to occur at the Hanford site. Little is known about the habitat requirements in Washington. Areas where they are known to occur have relatively undisturbed shrub-steppe habitat with a low cover of cheatgrass (USFWS 2007).

FIRE IMPACTS: If present during the fire, striped whipsnakes could have experienced mortality if unable to find a deep burrow or move quickly enough to avoid the flames or the disk/blade line cut during suppression. Eggs exposed to heat would have been rendered unviable. Indirect effects are more likely. The entire 51,356 acres of shrub-steppe habitat that burned during the Wautoma Fire is potential striped whipsnake habitat. Rodent burrows, canyons, and ravines are present on lands adjacent to the burn area and such habitat serves important functions in the life history of whipsnakes. Rodent burrows in sagebrush, near tallus slopes, canyons or ravines are considered optimal striped whipsnake habitat (Nordstrom and Whalen 1997). Due to repeated fires on the Monument area, this loss is combined with cumulative losses (see section on Cumulative Impacts of Fire on HRNM in Executive Summary). Other indirect impacts include displacement and increased predation. Suppression actions, which included blading of soils to remove vegetation, may have exposed nest sites to environmental conditions and predators and/or destroyed nest sites. Prey species are primarily lizards, but may include rodents, bats, frogs, birds, and other snakes. Habitat within the fire area for any of these species was greatly reduced. Therefore, prey species may be less-available for the striped whipsnake until the habitat recovers and is repopulated by the various prey species. Invasion of cheatgrass into the fire area will reduce the likelihood that this area would recover into habitat that could support striped

whipsnakes.

ELK

Elk is a species of Tribal importance. Elk first appeared naturally on the ALE in 1972 (USFWS 2000). Those individuals using the ALE are a part of a larger population referred to as the Yakima Herd, which populates the Rattlesnake Hills from the ALE west to Yakima. Although elk are not traditionally found in sagebrush steppe habitats, zooarchaeological evidence suggests elk historically inhabited the arid Columbia Basin, but were hunted to extinction by 1850. The Rattlesnake hills elk have shown a consistently high level of productivity over the 17 years that data have been collected (USFWS 2000) (see Elk and Mule Deer Concentration Areas and Wildlife Species of Concern Maps).

The long term (1983-1993) growth trend for the Hanford elk herd averages a 20% increase annually, indicating that the sagebrush steppe ecosystem is excellent habitat for elk (USFWS 2000). The herd is attracted to ALE by high quality habitat and a lack of disturbance. Hunting has not been allowed on ALE, and there is only limited public use, mostly research activities. As a result, when hunting begins outside ALE, all of the elk in the area move into the sanctuary provided by ALE. In 1998 the estimated calf production of approximately 150 brought ALE elk numbers to about 750. The increasing herd size has increased local concern regarding elk depredation of agricultural crops in areas surrounding ALE. During the winter of 1999/2000, 175 elk were removed from the herd and relocated to other areas within the State. From 2000-2006, the elk population has ranged from 450 to more than 800 animals (HRNM/SMNWR 2006). The population in July 2000 was assumed to be approximately 575 adult animals with the potential of 130 calves present (USFWS 2000).

The elk distribution during early summer has traditionally been in the higher elevation areas of ALE (USFWS 2000). The elk were using these upper elevation areas for calving during the two to three weeks prior to the fire.

FIRE IMAPCTS: Elk are highly mobile animals, and it is anticipated that most were able to move out of the affected area during the fire and also avoid related suppression actions. Following the Wautoma Fire, however, a badly burned calf was discovered. A dead adult was also found approximately 10 days following the fire. The greatest impact to elk within the burn area is loss of available forage. Due to the timing of the fire, it is not anticipated that any appreciable rainfall, and therefore any regrowth of grasses, will occur until the fall rains begin.

Impacts of the elimination of above ground forage species within the burn area include: 1) Elk will forage off of the burn area on private lands. This will continue to exacerbate the problem of depredation of agricultural crops (wheat, alfalfa, orchards and vineyards); 2) Elk may experience nutritional stress related to the decrease in forage availability; and 3) Elk may forage exclusively on alternative ALE vegetation that

experience better growing conditions, notably riparian shrubs and young trees that are used by sensitive bird species, to the detriment of these plants.

Lactating cows may be at the greatest risk of nutritional stress because of the energy demands that lactation produces (USFWS 2000). Additional indirect impacts to the elk include exposure to collisions with vehicle traffic within and adjacent to the fire area. As the elk move into different areas seeking forage, they are likely to cross Highways 240, 225, 24, and 221. An additional indirect effect may be that if elk continue to remain on private lands during the late summer and fall seasons, this herd will experience greater vulnerability to hunting pressure during the upcoming hunting season. Private lands surrounding the ALE area are open to elk hunting. If elk move into Central Hanford, they will be a cause of concern for Hanford facilities operations, particularly if they move onto the BC-Cribs radiation control zone (USFWS 2000).

Stabilization of the fire area with native grass species will be important for management of elk. Native grasses will provide forage and dissuade them from foraging on crops on adjacent private land. Establishment of native grasses on ALE lands will also reduce the browsing pressure on riparian shrubs and trees.

MULE DEER

Mule deer is a species of Tribal importance. Mule deer are a common resident ungulate of the Hanford Monument area (USFWS 2000). The area of highest density is along the Columbia River. The deer population in the Hanford Monument area is relatively stable (see Elk and Mule Deer Concentration Areas and Wildlife Species of Concern Maps). Mule deer are primarily browsers and rely on riparian vegetation and bitterbrush for browse (USFWS 2000). The deer tend to find shade for thermal cover in and around riparian areas (USFWS 2007).

FIRE IMPACTS: Most mule deer were not likely directly impacted by the Wautoma Fire or fire suppression. During post-fire reconnaissance on August 27, however, two females with spots of burned hair were observed. Mule deer are highly mobile animals, and it is anticipated that most were able to avoid flames and hot ash during the fire by migrating out of the affected area. Recently-born fawns, however, may not have been able to avoid the fire, although no mortality of deer fawns was documented during post fire reconnaissance. Indirect impacts include loss of habitat. The entire 51,356 acres within the Wautoma Fire footprint is potential mule deer habitat, with riparian habitat being especially important as cover. The greatest impact to mule deer within the burn area is loss of available forage (USFWS 2000). Re-growth of grasses in upland areas is not anticipated until fall rains begin. Therefore, mule deer may forage exclusively on alternative ALE vegetation that experience better growing conditions, notably riparian shrubs and young trees, to the detriment of these plants. Mule deer may forage off of the burn area on private lands, however, because deer are more solitary than herding ungulates (e.g., elk), agricultural depredation is not usually an issue with deer (USFWS 2000). Additionally, deer may also experience some nutritional stress due to loss of forage due to the fire. Lactating females may be at the greatest risk of nutritional stress because of the energy demands that lactation produces. Deer will be much more

vulnerable during the coming fall hunting season, due to lack of suitable hiding cover on the Monument, and additional hunting pressure in areas where the deer have moved off of the Monument onto private lands (USFWS 2000).

IV. RECOMMENDATIONS

A. Fire Suppression:

Determinations of effect: The fire and suppression actions had no directly attributable affect to Federally-listed species. Furthermore, proposed emergency stabilization will have no effect on Federally-listed species. Therefore, there is no need for emergency Section 7 Consultation for the Wautoma Fire stabilization and emergency rehabilitation. Indirect impacts, however, due to loss of habitat occurred to several Federal species of concern and State sensitive species. Stabilization and rehabilitation treatments will mitigate habitat damages due to fire and benefit listed species. Supporting documentation is included in the environmental compliance section of this report.

B. Emergency Stabilization:

Recommendations with Specifications:

#2 **Non-native invasive species control- Integrated Pest Management**. Stabilize soil to prevent loss or degradation of productivity by direct treatment of invasive plants using integrated pest management techniques to minimize the establishment of non-native invasive species within the burned area. Use integrated pest management techniques (herbicides, biological, mechanical, and cultural control methods) as appropriate to prevent the spread and establishment of noxious weeds within the fire area. This specification is critical to prevent the degradation of productivity and to promote the recovery of critical natural resources in the riparian and shrub-steppe areas.

#3 Ecological stabilization**, native seeding**. Stabilize soil to prevent loss or degradation of productivity by seeding to prevent establishment of invasive plants. This specification is critical to stabilize the ecological integrity and condition of the burned area-including stream channels and banks that will eventually result in functional recovery of the riparian- and shrub-steppe areas.

C. Management recommendations (Non-Specification Related):

- Permanent photo points and monitoring plots should be established in key wildlife habitat locations to monitor habitat recovery. This should be coordinated with the vegetation monitoring as recommended in the Wautoma Fire BAER Vegetation Report.

V. Consultations

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VI. References:

Flinders, J.T. and J.A. Chapman. 2003. Black-tailed Jackrabbit. Pages 126-146 *in* Feldhamer, G.A., B.C. Thompson and J.A. Chapman, editors. Wild mammals of North America: biology, management, and conservation. Johns Hopkins University Press, Baltimore, Maryland, USA.

Hallock, L.A. and K.R. McAllister. 2005. *Sagebrush Lizard*. Washington Herp Atlas. http://www.dnr.wa.gov/nhp/refdesk/herp/

Hallock, L.A. and McAllister, K.R. 2005. *Striped Whipsnake.* Washington Herp Atlas. http://www.dnr.wa.gov/nhp/refdesk/herp/

Harniss, R. O. and R. B. Murray. 1973. *30 years of vegetal change following burning of sagebrush-grass range*. J. Range Manage. 26:322-325.

Johnson, R.E. and K.M. Cassidy. 1997. Mammals of Washington State: location data and modeled distributions. Washington State GAP analysis, Volume 3. Washington Cooperative Fish and Wildlife Research Unit, Seattle, WA.

Leu, M.and D. A. Manuwal. 1996. *Habitat requirements, status, and management of the loggerhead shrike of the Yakima Training Center*. Final Report, College of Forest Resources, University of Washington, Seattle, Washington, USA.

Martin, J. W., and B. A. Carlson. 1998. *Sage Sparrow* (*Amphispiza belli*). *In* The Birds of North America, No. 326 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Nordstrom, Noelle. 2004. Burrowing owl (*Athene cunicularia*). *In* E. M. Larsen, J. M. Azerrad, and N. Nordstrom, editors. Management Recommendations for Washington's Priority Species, Volume IV: Birds [Online]. Available http://wdfw.wa.gov/hab/phs/vol4/buow.pdf

Nordstrom, N and M. Whalen. 1997. Striped whipsnake (*Masticophis taeniatus*) *In* E.M. Larsen (ed). Management Recommendations for Washington's Priority Species, Volume III: Amphibians and Reptile [Online]. Available http://wdfw.wa.gov/hab/vol3.pdf

Olendorff, R. R. 1993. *Biology and management of ferruginous hawk (Buteo regalis): a review*. Occasional Papers Number 1. Raptor Research and Technical Assistance Center, U.S. Bureau of Land Management, Boise, Idaho, USA.

Poole, L. 1992. *Reproductive success and Nesting Habitat of Loggerhead shrikes in Shrub-steppe communities*. Masters Thesis. Oregon State University, Corvallis, Oregon. 69 pgs.

Richardson, S., M. Whalen, D. Demers, and R. Milner. 2004. Ferruginous hawk (*Buteo regalis*). *In* M. Larsen, J. M. Azerrad, and N. Nordstrom, editors. Management Recommendations for Washington's Priority Species, Volume IV: Birds [Online]. Available http://wdfw.wa.gov/hab/phs/vol4/feruge.htm

Storm, R. M and W. P Leonard, Eds. 1995. *Reptiles of Washington and Oregon*. Seattle Audubon Society, Seattle, Washington.

The Nature Conservancy of Washington. 1999. *Biodiversity Inventory and Analysis of the Hanford Site*, Final Report 1995-1999.

U.S. Fish and Wildlife Service. 2000. 24 Command Fire. Burned Area Emergency Rehabilitation (BAER) Plan. Prepared by the Northern States Burned Area Emergency Rehabilitation Team.

U.S. Fish and Wildlife Service. 2007. Overlook Fire. Burned Area Emergency Rehabilitation (BAER) Plan. Prepared by the U.S. Fish and Wildlife BAER Team, Hanford Reach National Monument, Richland, WA.

U.S. Fish and Wildlife Service. 2002. *Birds of conservation concern 2002.* Division of Migratory Bird Management, Arlington, Virginia. 99 pp.

Vander Haegen, Matthew. 2004. Loggerhead Shrike (*Lanius ludovicianus*). *In* E. M. Larsen, J. M. Azerrad, and N. Nordstrom, editors. Management Recommendations for Washington's Priority Species, Volume IV: Birds [Online]. Available http://wdfw.wa.gov/hab/phs/vol4/losh.pdf

Vander Haegen, Matthew. 2003. Sage Thrasher (*Oreoscoptes montanus*). *In* E. M. Larsen, J. M. Azerrad, and N. Nordstrom, editors. Management Recommendations for Washington's Priority Species, Volume IV: Birds [Online]. Available http://wdfw.wa.gov/hab/phs/vol4/sage_thrasher.pdf

Vander Haegen, Matthew. 2003. Sage Sparrow (*Amphispiza belli*). *In* E. M. Larsen, J. M. Azerrad, and N. Nordstrom, editors. Management Recommendations for Washington's Priority Species, Volume IV: Birds [Online]. Available http://wdfw.wa.gov/hab/phs/vol4/sage_thrasher.pdf

Washington Department of Fish and Wildlife. 1996. *Washington State recovery plan for the Ferruginous hawk*. Olympia, WA 63 pgs

Washington Department of Fish and Wildlife. 2005. *Washington natural heritage and priority species databases. WDFW Priority Habitats and Species Program,* Olympia, WA.

Watson , J.W. 2003. *Scientists seek reasons for declining Ferruginous hawk population*. Fish and Wildlife Science; an on-line science magazine, Washington Department of Fish and Wildlife.

Woodruff, K. and H. Ferguson. 2005. Townsend's big-eared bat. In EM Larsen, JM Azerrad, and N Nordstrom (editors). Management recommendations for Washington's Priority Species, Volume V: Mammals. Available http://wdfw.wa.gov/hab/phs/vol5/townsendbat.pdf

Yosef, R. 1996. *Loggerhead Shrike* (*Lanius ludovicianus*). *In* The Birds of North America, No. 231 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

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BURNED AREA EMERGENCY STABILIZATION PLAN
Wautoma Fire
OPERATIONS ASSESSMENT

I. OBJECTIVES

- Identify, inventory, and map fire suppression impacts on jurisdictions affected by the fire.
- Specify rehabilitation measures to mitigate fire suppression impacts.
- Ensure specification recommendations are consistent with agency objectives.
- Protect natural and cultural resource values during rehabilitation efforts.

II. ISSUES

- Extensive soil disturbance on highly erodable soils from fire suppression activities.
- Damage to fences and gates within fire perimeter associated with fire suppression actions.
- Potential impacts to critical natural and cultural resources from suppression actions.

III. OBSERVATIONS

A. Background

Please refer to fire history summary, included in the Executive Summary.

B. Reconnaissance Methodology

On August 19 and 20, 2007 Mid-Columbia River National Wildlife Refuge Complex (MCRNWRC) staff began evaluating resource impacts caused by the suppression effort on lands and physical improvements with the Wautoma fire area. Additional evaluation was conducted on August 28, 2007 in conjunction with a BAER team from First Strike Environmental Company contracted to develop the BAER plan. Team members did reconnaissance from the ground and obtained information from suppression forces. Information was also gathered from interviews with Division Supervisors, and from engine crews assigned to the fire.

C. Findings

The Wautoma fire burned approximately 72,641 acres total; including 51,356 acres within U.S. Fish and Wildlife Service jurisdiction on the Hanford Reach National Monument, 10,102 acres on Department of Energy Hanford Site to the east of Washington state Highway 240,and 11,183 acres on private lands west of the Monument in Benton County, Washington. Approximately 31.67 miles total of disk and dozer line were constructed on the perimeter of the Wautoma fire, with 13.21 miles of

disk/dozer line on the Hanford Reach National Monument. The estimated damage to resources on the Monument is 25.6 acres (based on an average 16 foot width). One gate was impacted by suppression crews and backfiring operations along the HRNM boundary to prevent fire spread onto private lands to the south and west. Interior service roads that were driven extensively for suppression and mop up are now damaged and impassible due do the amount of lose powdery soils resulting from the destruction of soil structure in the upper horizons. Damage, attributed to backfiring also occurred on previously restored shrub areas (plantings).

Rehabilitation of suppression line is necessary to protect habitats from noxious weed infestation and to minimize fragmentation of ecological areas. Monitoring of suppression lines is necessary to determine the need for future noxious weed mitigation needs. Dozer lines and disk lines within the burned area on lands managed by U.S. Fish and Wildlife Service will be treated according to methods described in the Hanford Site Biological Resource Management Plan (HSBRMP, 2001). A cultural resource assessment has been initiated on all suppression lines within the fire (refer to Cultural Resources Assessment). Further field visits and assessments of cultural resource impacts due to suppression will be subsequent to this plan.

There are five types of suppression impacts to be considered:

- Dozer and disk line built on U.S. Fish and Wildlife Service which require restoration and revegetation. This will require adequate soil moisture to establish a firm seedbed prior to reseeding actions.
- Dozer and disk line built on U.S. Fish and Wildlife Service which require restoration and NO re-vegetation that will be maintained for fire break areas.
- Repair of a gate on the HRNM.
- Access roads to the fire area that were used for suppression actions are now impassible due do the amount of lose powdery soils resulting from the destruction of soil structure in the upper horizons. These roads will be rehabilitated as weather permits (accumulation of adequate moisture).
- Ecological rehabilitation plantings (installed prior to the Wautoma Command Fire) were impacted by the suppression actions and will need to be replaced.

IV. RECOMMENDATIONS

A. Fire Suppression- (non-specification related-charged to suppression account)

- **Dozer, disk line and Road Rehabilitation**. Rehabilitate dozer lines, disk lines and other sites directly or indirectly impacted by fire suppression activities. Dozer line and disk line rehab should be done at a later date due to the degraded soil conditions at this time. This activity should take place in the late fall or early winter when soil moisture content is higher. Impacted areas will be rehabilitated, re-contoured and re-vegetated. Roads will be re-contoured, re-graded and re-graveled; the gate 120 road and the gate 118 cut-off road that had gravel prior to

the fire will require re-graveling.

- **Dozer, disk line and Fire Break**. Maintain fire break and dozer and disk line created around U.S. Fish and Wildlife Service facilities at the ALE site reservoir, garage and pole buildings.

- **Replace gate.** Replace gate on the perimeter of the fire between HRNM boundary and other private lands. This gate will need to be replaced with new, similar materials.

- **Replace Plantings.** Replace areas that had received ecological rehabilitation treatments prior to the Wautoma Command Fire. Approximately 475 acres of sagebrush plantings were lost due to suppression; these areas will need to be replanted. Approximately 190,000 Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) plants were lost due to suppression actions.

B. Management (non-specification related)

- Continue to review rehabilitation specifications with operators and other personnel associated with implementation of the BAER Plan to insure suppression rehabilitation specifications are clearly understood for protection of sensitive resources and land productivity. Ensure proper accounting procedures are followed in the repair of suppression related impacts through suppression accounts.

- Guarantee safety of personnel assigned to rehab operational assignments in the fire area.

- Monitor suppression related damage on dirt roads following fall and winter moisture events to see if additional rehab measures are necessary.

V. CONSULTATIONS

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VI. REFERENCES

USDI, 1995. BAER Field Team Leader Reference Book
DOE, 2001. Hanford Site Biological Resource Management Plan

BURNED AREA EMERGENCY STABILIZATION PLAN
WAUTOMA COMMAND FIRE
WATERSHED AND SOIL DAMAGE ASSESSMENT

I. OBJECTIVES

- Assess overall watershed changes from the fire, particularly those that pose substantial threats to human life, property, and critical natural and cultural resources. This includes evaluating changes to soil conditions, hydrologic function, and watershed response to precipitation events, stream flow conditions, concentrated ungulate (elk and deer) grazing, and high winds.
- Identify the most critical soil and watershed areas and issues related to the Wautoma Fire based on increased flood potential and loss of soil resources from water and wind, and prescribe treatments to mitigate impacts and risks.
- Discuss burn severity.
- Identify future monitoring needs.
- Provide management recommendations to assist in vegetation recovery, watershed stabilization, site productivity and species habitat protection and rehabilitation.

II. ISSUES

- Protection of watershed stability and minimizing the impacts of watershed degradation and the associated wildlife and vegetation.
- Stabilization of watershed and riparian areas around springs, riparian corridors, and wetland areas.
- Threats to water quality of springs and riparian corridors.
- Develop management strategies that provide for the stabilization, natural regeneration and recovery of impacted areas.
- Threats to human life and property in and adjacent to the burned area from wind-blown dust.

III. OBSERVATIONS

A. Background Information

This report identifies and addresses known and potential impacts to soil and watershed function in the Wautoma Fire which burned an area of the Hanford Reach National Monument (Monument). This report provides detail on the observed damage to the soil resources and watershed function, will discuss mitigation measures to reduce significant degradation impacts caused by changes to the watershed due to fire, as well as recommend future monitoring criteria, and management considerations for recovery of

riparian corridors.

Overview of the Wautoma Fire: The burned area consists of approximately 72,641 acres of contiguous area; 51,356 acres are within the boundaries of the Monument (See Map 2, Appendix III). Generally the remaining burned areas are located west of the Monument on private lands and to the east on DOE land (See Map 1, Appendix III).

Geology/Physiography: The Wautoma Fire occurred within the semi-arid Pasco Basin of the Columbia Plateau on the northern and northeastern flank of Rattlesnake Mountain. Elevations of the burn area range from approximately 450 feet (137 m) above mean sea level (amsl) along the Yakima River to 3581 feet (1091 m) amsl atop Rattlesnake Mountain. All burned watersheds drain either southwest toward the Yakima River or northeast to the Cold Creek Valley. The upper northeast-facing portion of Rattlesnake Mountain is steep, with slopes up to 60-percent (%). Rattlesnake Mountain above approximately an elevation of 2000 feet amsl is underlain by the Miocene Columbia River Basalt which is composed of a series of basalt flows interbedded with fluvial and lacustrine sediments consisting of mud, sand, and gravel deposited between volcanic eruptions. These sedimentary interbeds are collectively called the Ellensburg Formation. The Pleistocene Hanford formation underlies much of the lower portions of the northeast flank of Rattlesnake Mountain below approximately 1000 feet amsl and consists of deposits from a series of cataclysmic floods. These floods occurred when ice dams broke releasing water from glacial Lake Missoula. Two facies are recognized, the Pasco gravels and the Touchet Beds (Kasper and Glantz, 1987). The Pasco gravels consist of coarser sands and gravels that were deposited in high-energy environments of rapid currents. The Touchet Beds consist of finer sands and silts that represent a low energy (slack water) environment found on the basin margins and the flanks of the surrounding ridges. Holocene surficial deposits consisting of silt and sand form a thin veneer (less than five meters) across much of Cold Creek Valley. These deposits consist dominantly of laterally discontinuous sheets of wind-blown silt and fine-grained sand. Surficial geologic units in the area are shown on a map and described in a report by Hartman (2000).

Precipitation: The precipitation of the Wautoma Fire burn area is strongly influenced by a rain shadow extending eastward from the Cascade Mountain range. This region, classified as mid-latitude semi-arid, receives less than 8 inches of average annual precipitation and is the hottest and driest portion of the Columbia Basin. Most precipitation falls from October through April and is directly proportional to elevation. Within the burn area, precipitation can vary from as little as 5 inches within Cold Creek Valley (420 feet elevation) to over 14 inches on Rattlesnake Mountain (3,581 feet elevation). Snowfall during December to February accounts for approximately 38% of total precipitation, while the months of July and August typically are the driest. Prevailing winds are from the northwest but occasional strong winds from the southwest also occur. Thunderstorm cells associated with passage of strong cold fronts can produce high velocity winds and localized intense rainfalls. Table 1 indicates what probable rain occurrence and intensity may occur for this region.

Table 1. Recurrence Intervals and Precipitation Amounts for Storm Events (Hanford Site Climatological Data Summary 1999 with Historical Data).

Return Period (years)	1 Hour Duration (inches)	24 Hour Duration (inches)
2 0	.22	0.70
20	0.44	1.26
100	0.58	1.61

This table indicates that for most probable occurring rainfall events, precipitation would be relatively moderate to light. Rainfall amounts for different storm durations are prepared from the entire data record. Data collected from the last 8 years will most likely be similar to the ones calculated for the 1999 report and are adequate for preparing an evaluation of soil erosion potential relative to storm events.

Soils: Hajak (1966) describes 11 different soil types occur within the burned area at the Monument. Table 2 shows the coverage of soils occurring within the burned portion of the Monument. A soil map is included in Appendix III (see Map 8).

Table 2. Soil types occurring within the Wautoma Fire burned area.

Soil Name	Acres	% of Burn
Burbank Loamy Sand	266	0.5%
Ephrata Sandy Loam	0	0.0
Hezel Sand	2,662	5.2%
Koehler Sand	550	1.1%
Kiona Silt Loam	3,166	6.2%
Lickskillet Silt Loam	10,860	21.2%
Esquatzel Silt Loam	2,887	5.7%
Quincy (Rupert) Sand	152	0.3%
Ritzville Silt Loam	13,370	26.2%
Scootney Stony Silt Loam	1,717	3.4%
Warden Silt Loam	15,352	30.1%

The Quincy (Rupert), Hezel, and Koehler soils developed in wind-blown sand. They occupy hummocky terraces and dune-like ridges. They cover over 3,364 acres within the burn, or about 6.5% of the area. The dune areas comprise approximately 3,901 acres (the dune area is accounted for within the soil classes types listed in Table 2 above). These soils often occur in association with areas of dune sand. The Burbank soil contains a loamy sand surface underlain by gravel. It may occur with areas of dune sand. The Ritzville, Lickskillet and Kiona soils occur on hill slopes and ridges. They contain a loam or silt loam surface texture. These soils may be subject to sheet and rill erosion. The Ritzville soils are developed on fine-grained, aeolian sand and silt, referred

to as loess. The Ritzville and Kiona soils are shallow, while the Lickskillet soils are moderately deep to deep. The Warden soil is a deep soil normally found in foothills below steeper slopes. The Esquatzel and Scootney soils formed in alluvial deposits. They are deep soils and may be subject to gully erosion because of their position on the landscape.

A map of soils susceptible to wind erosion is in Appendix III. The wind erosion risk can be classified as high, moderate, or low. The primary distinction between the classes was created by overlaying the GIS layer showing the presence of cheat grass on the GIS layer showing the location of soils. The amount of each class is summarized in Table 3. A map of the wind erosion risk is in Appendix III (See Map 7).

Table 3. Wind Erosion Risk

Risk	Acres
High	5,685
Moderate	13,248
Low	32,423

Burn Severity: Burn severity is sown on Map Number 4 in Appendix III. Approximately 2,433 acres was either not burned or had a limited impact, 37,498 acres had low severity, 11,409 acres had moderate severity, and only 18 acres had high severity. The majority of the burned area that has less slope has soils with low severity burn, while the steeper slopes of Rattlesnake Mountain has moderate severity burned soil. High severity burned areas are concentrated around the Snively Springs complex (lower, homestead, and upper). During field reconnaissance, hydrophobic soils were generally not encountered on most of the site. However, some localized occurrences were detected in the riparian areas. This may lead to additional soil erosion impacts during high water flow conditions.

Wind and Dust storms: The predominant wind direction within the burn area is from the northwest. However, the strongest winds blow out of the southwest, although less frequently than from the northwest (Fayer et al., 1999). Winds capable of moving sand sized particles occur approximately 40 days per year. Seasonal changes in the average wind direction are not very large, but changes in the average wind speed can be fairly significant (U.S. Department of Energy, 1988). June has the highest average monthly wind speed (9.2 mi/hr [4.1m/s]), and the prevailing wind direction is from the west-northwest. In November and December, average wind speeds decreases to a minimum of 6.0 mi/hr (2.7 m/s), and the prevailing direction is from the northwest. Average diurnal changes in both wind speed and direction can be large, especially during the summer months. In July, hourly average wind speeds range from a low of 5.6 mi/hr (2.5 m/s) between 0900 and 1000 to a high of over 13.0 mi/hr (5.8 m/s) between 2100 and 2200. High-speed, gusty winds can occur any month of the year and reach the greatest velocities during the winter months. The maximum recorded peak gust at 50 ft (15.2 m) above the ground at the Hanford Meteorology Station is 80 mi/hr (36 m/s).

An average of eight dust storms a year that decrease visibility to below 6.2 mi (10 km)

occur at the Hanford Meteorology Station (U.S. Department of Energy, 1988). These dust storms last an average of just over three hours, but have lasted as long as 18 hours. The sand and dry soil of the Pasco Basin and local construction and agricultural activities are all sources of airborne dust in the area. Dust storms occur most frequently from March through May and also in September. Dust devils occur frequently on sunny days with light winds and seldom last for more than a few minutes. Sand drift potential in most of the burn area is the result of winds from the southwest (Glantz et al, 1990). Winds from the west and northwest also have some sand transport potential, but these components are small compared to the influence of southwesterly winds. Direction of sand drift varies with season. In the winter, sand drift potential is dominated by winds from the southwest. In the spring, the sand drift potential is governed by winds from the northwest, but the magnitude of the sand drift is the lowest of all seasons. In the summer, sand drift potential is governed by winds from the northwest. In the fall, the sand drift potential is dominated by winds from the southwest. During all seasons, the sand drift potential is greater after noon. A well developed band of sand dunes trending roughly east-west transects a part of the burn area. These dunes formed as a result of strong west-southwest winds blowing across the Hanford Site and up Ringold-Koontz Coulee, a natural low point for winds blowing through the basin. Most of this dune field is stabilized, but could likely become reactivated if anchoring vegetation is lost (Fayer et al., 1999).

The loss of vegetative cover has exposed fine sandy and silty soils to ablation. Nearly all soils within the burn area have a fairly high risk of wind erosion; however, certain soils within the burn area are especially susceptible. Areas with soils having the highest risk of wind erosion are shown on the Wind Erosion Map in Appendix III. The soils most subject to wind erosion are the Quincy (Rupert), Hezel, and Koehler soils, sand dune areas, and to a lesser extent the Burbank soil. These soils cover approximately 3,630 acres (approximately 7.1%) of the burn area and are subject to wind erosion are scattered throughout the burn. These soils have lost most of the vegetation that had been providing stability and some of the microbiotic soil crusts that had offered protection against erosion have also been burned.

When soils vulnerable to wind erosion are stripped of vegetation, soil particles become available for transport by the wind through either surface creep, saltation or suspension. Sand particles, especially larger ones, tend to move by surface creep (rolling or sliding along the ground) and form migrating sand dunes. Finer particles, especially silt and clay, tend to become airborne by saltation and rise high, travel far, and remain in suspension until rain washes them down or when the wind subsides (Chepil,1957).

Dust storms can create serious visibility problems on highways. The greatest risk of dust storms as a result of the fire occurs along State Highway 240 and other roads within the Hanford Site. Wind erosion is not expected to impact water quality in the Columbia or Yakima Rivers as most of the fine soil particles are expected to travel far from the area. Although wind erosion will not threaten water quality, it may hamper vegetative recovery. In many places, vegetation that has started to regrow can be buried or otherwise damaged by the blowing and shifting sand. It may take many years before these areas have re-established enough vegetation to reduce wind erosion.

Watershed: The fire's hydrologic area can be described as lying within the Pasco Basin of the Columbia River Basin. Perennial reaches of Cold Creek and Dry Creek flow within the burn area. These streams are part of the Yakima River watershed and receive base flows from springs along portions of their reaches.

Three major springs - Snively, Lower Snively and Rattlesnake - contribute to approximately 4.5 miles of high valued riparian corridors which provide high value wildlife habitat, especially for amphibians, birds, insects, and bats in an otherwise arid landscape. Flow from Benson spring travels for less than 2,500-feet before the entire flow seeps into the cobble-boulder dominated alluvial fan. Several other small springs (Doke, Ridge Spring and two unnamed springs (1 and 2) [near the former missile battery), occur along the flanks of Rattlesnake Mountain but do not contribute to any substantial surface water flows, although the vegetation taping the shallow groundwater provides localized habitat. Spring locations are shown on Map 17, Appendix III.

These riparian zones have been significantly impacted by the fire and fire suppression effort. The vegetation resources provided forage and cover for a variety of wildlife species, aesthetic values, watershed stability, and biologically diverse plant associations.

Downstream of the confluence of Dry and Cold Creeks, near Rattlesnake Springs, stream flow infiltrates into the sands of the valley bottom. The remaining channel drainages are ephemeral or intermittent, carrying seasonal snow melt water and storm flows. There are no perennial tributaries into either the Yakima or Columbia Rivers from the fire area. The mean annual runoff is low, approximating less than 3% of total precipitation.

The steep upper slopes of Rattlesnake Mountain influence channel morphology, with the north side inducing steep incised channels and the south side generating more gentle, less discernable channels. On the lower flanks of the mountain, channels are less entrenched, allowing the channels to meander and braid, developing floodplains. Any transported flows or sediments along the eastern and northern areas infiltrate and deposit along the flood plains and valley bottom sands. Flows off the west and southwestern areas of Rattlesnake Mountain generally are modified by pipes or diverted for irrigation uses. Only a few ephemeral channels have direct outflow to the Yakima River.

Groundwater of the region flows in a general west to east pattern toward the Columbia River. Little groundwater recharge from precipitation occurs in the Pasco Basin due to limited amount of the precipitation. Most precipitation is lost through evapotranspiration with less than 1% recharging groundwater. Studies suggest precipitation may contribute to groundwater recharge in areas where soils are coarse textured and bare of vegetation. In areas of past wildfires, soil moisture measured at depths of 275 centimeters increased when vegetation types changed from sagebrush to grasses. Soil moisture was greatest in late winter. Throughout much of the shrub-steppe region, the microbiotic soil crust facilitates infiltration of precipitation into the soil. Runoff in the area

of the burn is primarily generated by winter precipitation.

Warm Chinook winds have been known to cause rapid snowmelt during winter months, inducing runoff and minor flooding in the area. Flooding potential of Cold Creek was calculated by Skaggs and Walters, 1981, for probable maximum conditions. A 100 year flood would be about 3 feet deep, near the confluence of Cold Creek and its tributary Dry Creek. Dry Creek occasionally has crossed State Route 240 during past flood events.

Sedimentation may occur in some of the springs within the burn because of increased erosion in the contributing watershed. Because burn severity was low over the entire burn area, infiltration rates are not expected to decrease due to soil hydrophobicity. Areas with hydrophobicity were spotty and discontinuous and would not contribute to overland flow. Loss of vegetative cover will decrease infiltration rates for approximately the next 3 years. However, existing conditions prior to the fire already contributed to reduced infiltration rates. These conditions include sparse vegetation throughout the burn area, rocky slopes and shallow soils on Rattlesnake Mountain, and, on the southwest flank of Rattlesnake Mountain, compaction due to grazing. Prior runoff and flooding events have been recorded during winter months from snowmelt over frozen soils when vegetation has negligible effects to runoff. Therefore, the overall relative water yield increase due to the fire is expected to be minor and not exacerbate flooding events.

In areas where sagebrush cover was lost, minor increases in groundwater recharge may occur due to conversion to grasses which evapotranspire at lower rates and from shallower soil depths than sagebrush. The microbiotic soil crust cover, where undisturbed, should continue to facilitate infiltration. Some rill erosion is expected on steep slopes of the northern and eastern flanks of Rattlesnake Mountain. These sediments may be transported down into the stream network of Dry Creek, Cold Creek, and their springs during runoff events. Most entrained sediments would be deposited along the lower gradient floodplains and sandy valley bottoms. Localized effects should be expected but overall effects to the watershed would be minor.

Additionally, riparian vegetation was lost at Snively, Lower Snively and Rattlesnake Springs. An initial flush of sediment and ash is expected to these springs and perennial streams from affected riparian areas but amounts would be minimal. Because these systems do not have direct outlets to the Yakima River, no effect from sediment to the river is expected. Ephemeral streams on the south side of Rattlesnake Mountain may transport an initial flush of sediment and ash into the Yakima River but because of the small spatial size of these sub-watersheds, any inputs would have immeasurable effects.

Water temperatures may increase along perennial reaches and springs due to loss of shade-providing riparian vegetation.

B. Reconnaissance Methodology

Due to the focused nature of the reconnaissance methodology utilized by the First Strike-Shaw team, a through discussion of the entire burned area can not be prepared. However, personnel with the USFW provided a 1-day field reconnaissance trip of the Monument. The trip focused on the following areas: 1) along the ridge of Rattlesnake Mountain, 2) along the 1200 road, 3) Snively Spring and Lower Snively Spring, 4) Dry Creek and Cold Creek drainages, 5) Rattlesnake Spring, 6) and the 117 gate area. Stops along the trip are shown on Map 16, Appendix III. This assessment is based on the observations made during the trip, discussions with USFW staff, and documents reviewed. During the site reconnaissance, Shaw made observations on:

- Burn severity
- Soil Conditions
- Hydrophobic Soils
- Watershed Response
- Properly Functioning Conditions

Table 4 describes terms commonly used in assessing soils and watersheds that have been burned.

Table 4. Definitions of terms commonly used in soil and watershed assessments.

Term	Definition
Fire Intensity	Based on temperature, flame length, heat of combustion and total amount and size of fuel consumed. Accounts for convective heat rising into the atmosphere and fire effects on the overstory.
Fire Severity	Based on temperature, moisture content of duff and fuels lying on the ground, heat of combustion and total amount of duff and ground vegetation consumed. Accounts for the amount of conductive and radiant heat that goes down into the soil, affecting soil characteristics.
Burn Severity	A relative measure of the degree of change in a watershed that relates to the severity of the effects of the fire on watershed conditions. Burn severity is delineated on topographic maps as polygons labeled high, moderate, and low/unburned.
Watershed Response	A qualitative degree and/or modeled measure of how a watershed will respond to

	precipitation. Parameters include pre-existing soil moisture; amount and duration of rainfall; lag time between initiation of storm and peak flow runoff; and peak flow discharge (maximum cfs generated by a storm) and sediment yield. Changes in the characteristics of a watershed brought about by a fire increase the efficiency with which a watershed yields runoff. Burned watersheds shed more water faster.
Riparian Corridor Properly Functioning Conditions	A visual assessment of the stream function and its relationship to the riparian area. Includes hydrogeomorphic, vegetation, erosion, deposition, soils, and water quality. The condition of the riparian corridors where assess using the *"Riparian Area Management – A Users Guide to Assessing Proper Functioning Condition and Supporting Science for Lotic Areas"* guidance document for assessing properly functioning conditions (Prichard, 1993).

C. Findings

Summary. This section presents a summary of the significant findings as well and a detailed discussion of the findings. The findings for this assessment include:

1. Burn severity for soils was generally moderate. Isolated areas of sever burn severity were identified along riparian corridors.
2. Minimal soil erosion potential was identified along upper slopes of Rattlesnake Mountain.
3. Minimal potential for channel erosion along dry drainages off Rattlesnake Mountain.
4. Minimal discharge from minor springs that do not have overland flow discharge.
5. High potential for increased channel erosion in riparian corridors from Snively Springs complexes, Benson Spring, and Rattlesnake Springs.
6. Increased wind erosion potential in the up canyon areas of Cold Creek and Dry Creek Canyons.
7. The potential for increased wind erosion will create blowing dust and sand

that will cause an imminent road hazard along the northern portions of Highway 240 and will interfere with site operations at the Hanford Nuclear Reservation.

Minimal soil erosion potential along upper slopes of Rattlesnake Mountain. The upper slopes of Rattlesnake Mountain, even though steep and burned, did not show the indications of rill erosion. Most of the areas along the steep portions of Rattlesnake Mountain did not receive seeding or other treatment measures following the 24 Command Fire. Since the slopes survived the previous fires and they are primarily armored with loose rock and thin soil profiles, it is not likely that they will be exposed to excessive erosion in the near future.

Minimal potential for channel erosion along dry drainages off Rattlesnake Mountain. Visual reconnaissance of the dry stream channels along the 1200 road did not revel the evidence of excessive erosion. Some channels have varying amounts of sediments in the bottom. This is likely due to the low amounts of precipitation received annually, which results in little overland flow. The low precipitation in the area limits the amount of water available to the channels during normal rainfall events. It is likely that low rainfall amounts are readily absorbed in the soil profile with relatively little overland flow. In the event of a heavy snow pack melt or intense rainstorms, some erosion would be normal and expected.

Minimal overland flow from minor springs that do not have overland flow discharge. There was no overland flow visible at the Ridge Spring. USFW personnel indicate that the other minor springs (Doke, and unnamed springs 1 and 2) do not have flow. Therefore, there is no riparian corridor or wetland area for increased deer and elk browsing to damage.

High potential for increased channel and bank erosion in riparian corridors from Snively Springs complexes, Benson Spring, and Rattlesnake Springs.

The properly functioning condition of the riparian corridors was briefly evaluated at several locations. In general the lower reaches of the Snively Springs riparian corridor (where the stream, flows from the canyon below Lower Snively Spring, out on to the broader alluvial fan), and Rattlesnake Springs were it flows out of the deep erosional gulley appears to be in functioning condition, with only minimal down cutting (less than 6 to 10-inches). Some localized channels have developed.

The properly functioning condition of the portions of riparian corridor for Snively Springs (between homestead site and Snively Lower Spring), and the upper portion Rattlesnake Springs are significantly degraded (nonfunctional). Increased flow velocity of the stream caused down cutting and back erosion, and the road preventing the stream from meandering across the full width of the canyon. The stream channel in these sections are deeply eroded, limiting access of the stream during flood stages to spread out onto the floodplain, and have reduced sinuosity.

Fire has burned along most of the Snively Springs riparian corridor, lower portions of Rattlesnake Springs, and the Benson Spring area, but has not burned much of the upper portions of Rattlesnake Springs. The increased burn severity along the riparian corridors has created the presences of hydrophobic soils. The presence of hydrophobic soils along the stream corridors will increase runoff along the streams, especially when the stream stage rises over the bank. Substantial areas of white ash were observed in the areas where the vegetation was burned along the riparian corridors. The extent of the hydrophobic soils was not mapped.

The elk habitat has been greatly reduced in the areas surrounding the Monument due to encroachment by human activities. Most of the grasses within the Monument have been burned. The vegetation along the riparian corridors have experienced a higher percentage of burn (greater than 90% [USFW communication]) when compared to previous fires. The reduction of vegetation in the entire burn area will force ungulates to concentrate feeding on the remaining vegetation located along the riparian corridors, further reducing the limited amount of vegetation. Elk concentration areas are shown on Mao Number 14 in Appendix III. The concentration of elk and deer in the thin riparian corridors will cause the banks of the stream to be eroded.

The sediments that are deposited into the stream will increase turbidity. The fines will be deposited in areas that will damage the benthic community. Additionally, sediments will be carried downstream affecting culverts and other healthy riparian areas. Gravels and sands deposited in the stream could contribute to increased channel erosion, further deepening the channel.

Channel elevation relative to top-of-bank is critical to properly functioning conditions. As water levels in the channel rise, water needs to leave the channel and inundate the floodplain. Water in the floodplain tends to move slower, creating less erosion. As channels deepen flood waters will not have access to the floodplain, causing increased channel flow and velocities, created further channel erosion.

When the stream channel down cuts it will lower the localized groundwater table in the riparian corridor. Shallow rooting plants and new shrubs will not have ready access to groundwater and will either die or not get a start. Channel conditions once they become narrower, deeper, will cause stream flow velocities to increase further exasperating channel down cutting. The destruction of the stream channel, will remove the benthic community as a food source, greatly impacting the depended wildlife.

Based on these observations the riparian corridors are at great risk of permanent damage due to the effects of the Wautoma Fire. Once the stream conditions are damage, and reduced to nonfunctional, the stream would require extensive rehabilitation efforts to attempt restoration. Protection of the riparian corridors is essential to maintaining function conditions and protection of vegetation and wildlife.

Dust and Wind Erosion

In areas that were a shrub-steppe vegetation community prior to the fire, almost all plant and litter cover that was present in the burn area has been consumed by the fire. The loss of this vegetative cover has exposed fine sand and silty soils to ablation (wind driven erosion). Approximately 3,630-acres (see Map 7 Wind Erosion Risk in Appendix III) have a fairly high risk of wind erosion (please see photo documentation). Furthermore, sandy soils within the burn area are especially susceptible to wind and blowing dust poses an imminent threat to human life along state Highway 240 and working areas of Hanford (200 West and 200 East).

As a result of the 24 Command Fire in 2000, the Hanford facility to the east experienced major shut-downs due to dust in March and October 2001. In addition, Hanford workers with asthma who were sensitive to the dust were sent home. According to a Hanford spokesperson, blowing dust following the 24 Command Fire caused 4 to 5 shut-down episodes in the 200 West and 200 East areas. Richard Roos, a Botanist with Fluor Hanford, indicated that there is no functional difference between the 24 Command and Wautoma Fires in terms of the dust after-affects. There is a chronic dust hazard to the public using SR 240 and the workers in the 200 West and 200 East areas.

Increased wind erosion potential in the upper valley areas of Cold Creek and Dry Creek Drainages. The funneling of wind flow down the Cold Creek and Dry Creek drainages creates an area of high wind speeds capable of mobilizing exposed soils. The loss of vegetation cover in these areas presents a large source area for dust and sand, particularly in the areas where soils that are susceptible to high and moderate wind erosion risk are shown on Map 6 in Appendix III. USFW personnel indicate that once soil (dust or sand) is dislodged by either natural process (simple wind mobilization of particles, activation by a tumbling plant or animal, or by human activity such as a car or tractor) the particles that are dislodged will continue to dislodge other particles, which in turn dislodge other particles, perpetuating the generation of dust and blowing sand.

Increased wind erosion potential and imminent road hazard along the northern portions of highway 240. Sand dunes and silty deposits along the northern 10 miles of highway 240 are high risk of wind erosion. Dust that generates from these areas creates dangerous driving conditions on the highway. Reports of high winds and blowing dust in this area indicate that a high potential for dangerous driving conditions is imminent.

IV. RECOMMENDATIONS

A. Fire Suppression Rehabilitation:

1. Dozer, disk line and Road Rehabilitation.

Rehabilitate dozer lines, disk lines and other sites directly or indirectly impacted by fire suppression activities. Dozer line and disk line rehab should be done at a later date due to the degraded soil conditions at this time. This activity should take place in the late fall or early winter when soil moisture content is higher. Some areas will be rehabilitated and re-vegetated, and some areas will be

rehabilitated and maintained as fire break. See Map 3, Appendix III for fire suppression activities

B. Emergency Stabilization: (specification related)

The following recommended measures will help fulfill the ES objectives:

1. Construct rock check dams in selected portions of the riparian corridors along Upper Snively, Lower Snively, Benson and Lower Rattlesnake that have minimal stream degradation and the most intact properly functioning conditions.

Allowable Action and Approach: Placement of structures to slow soil and water movement in Riparian zones and stabilize soil to prevent loss or degradation of productivity.

The stability of the riparian corridors are at great risk for degradation from channel and bank erosion. It is likely that the properly functioning condition of the lower reaches of Snively and Rattlesnake riparian corridors will be changed to nonfunctioning due to down cutting, sedimentation, and bank erosion. The effects of down cutting will lower the localized groundwater elevation around the riparian corridor, which will reduce or eliminate the success of vegetation in the corridor. Protection of these reaches will prevent irreversible down cutting of the stream channel, protecting stream banks, and allowing riparian vegetation to survive.

Recommendation: Install 4 miles of rock check dams in Upper Snively, Lower Snively, Benson, and Lower Rattlesnake Riparian Corridors. See Part F Specification: S-5: Rock Check Dams.) Locations of rock check dams are shown on Maps 18, 19, 20, and 21, in Appendix III.

2. Construct log jams in selected portions of deeply incised stream channels along Snively and Rattlesnake riparian corridors.

Allowable Action and Approach: Placement of structures to slow soil and water movement in Riparian zones and stabilize soil to prevent loss or degradation of productivity.

The stability of the riparian corridors with in canyon areas (downstream from the Snively Spring Homestead) are at great risk for additional degradation from channel erosion. These sections have already experienced substantial degradation. The log jams can hold material in the canyon bottom, preventing it from being carried into the lower portions of the riparian corridor habitat (which is currently in good condition and would be devastated by deposition of sediments and debris).

Recommendation: Install 1.7 mile of log jams in Upper Snively, Lower Snively and Lower Rattlesnake Riparian Corridors. See Part F Specification: S-6: Log Jams.). Locations of log jams are shown on Maps 18, 19, 20, and 21, in Appendix III.

3. Construct fenced vegetation reserves with supplemental plantings along the riparian corridors to preserve areas of vegetation from excessive elk and deer browsing and promote bank stability from anticipated increased stream velocities and flows.

Allowable Action and Approach: Installing protective fences or barriers to protect treated or recovering areas.

The concentration of elk browsing on the minimal remaining vegetation will severely erode banks, depositing fine and coarse material into the channel. The deposition of material will impact stream benthic communities, which are the food source for wildlife (more details on which critters). Riparian corridor stream bank stability can be protected by fencing sections of steam reaches and associated remaining riparian vegetation. Elk fencing consisting of 80-foot wide (40 feet to each side of the channel center line) by 300 foot long fence will protect vegetation from elk browsing. Bank stability which will be the target of increased stream flow can be protected with selected bare root planting.

Recommendation: Install 3.5 miles of fenced areas in Upper Snively, Lower Snively, Benson, and Lower Rattlesnake riparian corridors. See Part F Specification: S-7: Elk Fenced Vegetation Riparian Corridor Reserves.) Locations of elk fencing are shown on Maps 18, 19, 20, and 21, in Appendix III.

4. Broadcast seed riparian corridors to promote floodplain stability.

Allowable Action and Approach: Stabilize soil to prevent loss or degradation of productivity by seeding to prevent establishment of invasive plants; and direct treatment of invasive plants and by using integrated pest management techniques to minimize the establishment of non-native invasive species within the burned area.

During increased flow conditions, such as during snow melt, it will be essential to have vegetation growing in the floodplain along the riparian corridors. The vegetation assists with reducing velocities and filtering suspending sediments from flood waters, preventing the sediments from being transported downstream and covering health benthic communities.

Recommendation: Broadcast seed along 50 acres in Upper Snively, Lower Snively, Benson, and Lower Rattlesnake riparian corridors. See Part F Specification: S-10: Riparian Corridor Broadcast Seeding.). Locations of broadcast seeding are shown on Maps 18, 19, 20, and 21, in Appendix III.

5. Broadcast seed in the portions of Cold Creek and Dry Creek drainages that act as wind corridors to establish vegetation for dust suppression.

Allowable Action and Approach: Stabilize soil to prevent loss or degradation of productivity by seeding to prevent establishment of invasive plants; and direct treatment

of invasive plants and by using integrated pest management techniques to minimize the establishment of non-native invasive species within the burned area.

Due to the burning of vegetation in areas of high erodiblilty soils in areas where the wind is funneled down Cold Creek and Dry Creek drainages, dust and blowing sand will be created. The movement of the dust and sand is an immediate threat to public safety along Highway 240.

Recommendation: Broadcast seed with Hydromulch. Hydromulching in the Vernita Basin after the 2005 Weather Station Fire at the HRNM resulted in the successful stabilization of soil. Based on this success and well documented studies (BAER Treatment Catalog, 2006) indicating that hydromulching is an effective soil stabilization measure, hydromulching is being recommended in selected areas of the Wautoma Fire. (See Part F Specification: S-10: Aerial Broadcast Seeding.)

6. Install drift/silt fencing along Highway 240 to control blowing sand.

Allowable Action and Approach: Installing protective fences or barriers to protect treated or recovering areas.

Stabilized and quasi-stabilized sand and silt areas that were burned have lost all or most of their protective vegetation. Wind will increase erosion of sand and dust from these source areas beyond pre-fire ablation conditions, leading to reactivation of sand dunes in portions of the burned area. This will cause sand dunes to migrate in an east to northeast direction based on direction of past dune migration. Dunes may migrate onto roadways, increasing the risk of vehicular accidents in and adjacent to the burned area, including risk of human injury and/or fatalities.

Recommendation: Silt fences are appropriate as an ES measure in areas with high values at risk (BAER Treatment Catalog). Human safety is considered a high value and failure to implement this ES measure would put humans at risk. Install 9 miles of drift fence along highway 240. (See Part F Specification: S-8: Public Safety: Drift Fencing.)

7a. Install 4 parallel rows vegetation stripping approximately 300 behind the drift fencing adjacent to the Highway.

Allowable Action and Approach: Installing protective fences or barriers to protect treated or recovering areas; placing structures (e.g. matting) to slow soil and water movement; stabilize soil using matting to prevent loss or degradation of productivity.

Situation: The area adjacent to Highway 240 is exposed to high winds funneled down Cold Creek and Dry Creek valleys and is comprised of soils that have a highly susceptibility of wind erosion. In addition the area can experience wind scouring or deposition, which can greatly reduce the success of broadcast seeding.

The scouring and deposition of silt and sand wind can be somewhat controlled by

forcing scouring and deposition to occur in narrow (approximately 50 foot wide zones) using silt fencing. The silt fencing will force scouring on the upwind side and deposition on the down wind side. Soils and a planted seed bed in the scouring area can be protected by the use of jut matting or other woven textile blankets.

The installation of 4 rows of silt fence, with 50 foot wide protected seed beds, separated by a 125 to 200 foot area of deposit area, will create 4 parallel vegetative strips that will greatly assist with dust control along the highway.

The area adjacent to Highway 240 is exposed to high winds funneled down Cold Creek and Dry Creek drainages and is comprised of soils that have a highly susceptibility of wind erosion. In addition the area can experience wind scouring or deposition, which can greatly reduce the success of broadcast seeding.

To ensure the viability of the vegetative strips for dust control, an aerial application of dust suppressants would further reduce the potential for wind to scour the vegetative strip seed beds.

Recommendation:

- Install 9 miles of silt fencing along DOE roadways, in the area that is seed drilled (See Part F Specification: S-8 Public Safety.)
- Install 9 miles of erosion control matting along the silt fencing, along DOE roadways, in the area that is seed drilled (See Part F Specification: S-9 *Public Safety).*

8. Seed drill the area along Highway 240 to reduce dust erosion.

Allowable Action and Approach: Stabilize soil to prevent loss or degradation of productivity by seeding to prevent establishment of invasive plants.

The area adjacent to Highway 240 is exposed to high winds funneled down Cold Creek and Dry Creek valleys and is comprised of soils that have a highly susceptibility of wind erosion. In addition the area can experience wind scouring or deposition, which can greatly reduce the success of broadcast seeding.

Recommendation: Seed drill a strip of land along Highway 240 approximately 600 yards wide by 9 miles long (approximately 2,200 acres) to prevent dust erosion (See Part F Specification: 3 Public Safety: seed drill.

C. Rehabilitation (non-specification related treatments)

Submit long-term rehabilitation plan as required to stabilize soils, control non-native invasive species and protect ecological integrity of the site.

D. Management Recommendations (non-specification related)

- *Continue to review rehabilitation specifications with operators and other personnel associated with implementation of the BAER Plan to insure suppression rehabilitation specifications are clearly understood for protection of sensitive resources and land productivity.*

- *Provide for the safety of personnel assigned to rehabilitation operational assignments in the fire area.*

- *Monitor suppression related damage on dirt roads following fall and winter moisture events to see if additional rehab measures are necessary.*

- *Coordinate emergency stabilization needs with the Department of Energy and The Washington Department of Transportation to ensure public safety is protected along county roads and state Highway 240. A meeting of USFWS and ODOE staff was conducted on August 29, 2007 to coordinate anticipated emergency stabilization activities including dust control.*

V. CONSULTATIONS

Kevin Goldie, USFW
Heidi Newsome, USFW

VI. REFERENCES

Chepil, W.S., 1957. *Erosion of Soil by Wind. Soil, the Yearbook of Agriculture*, 1957. The United States Department of Agriculture, Washington, D.C. The United States Government Printing Office.

Dinicola, Richard S., 1997, *Estimates of Recharge from Runoff at the Hanford Site, Washington, Water-Resources Investigations Report 97-4038, U.S.G.S.*, Tacoma, Washington.

Fayer, M.J., E,M. Murphey, J.L. Downs, F.O. Khan, C.W. Lindenmeier and B.N. Bjornstad, 1999, *Recharge Data Package for the Immobilized Low-Activity Waste 2001 Performance Assessment*. Prepared for the USDOE by Pacific Northwest National Laboratory, PNNL- 13033.

Prichard, Don, et al. *Riparian Area Management, Process for Assessing Properly Functioning Condition*. U.S. Department of the Interior, Bureau of Land Management

Proper Functioning Condition Work Group. Technical Reference 1737-9, 1993; Revised 1995, 1998.

USDOE, 2000, *Hanford Site Climatological Data Summary 1999 with Historical Data, PNNL-13117 UC-603*, Richland, Washington.

Preliminary Results of Hydromulch Treatment, Weather Station Fire, HRNM

Burned Area Emergency Response Treatments Catalog, U.S. Department of Agriculture, May 2006.

APPENDIX II - ENVIRONMENTAL COMPLIANCE

- **Environmental Compliance Considerations and Documentation**
- **NEPA Environmental Screening Checklist and Categorical Exclusion**

ENVIRONMENTAL COMPLIANCE CONSIDERATIONS, DOCUMENTATION, AND CONSULTATIONS

Wautoma Fire Burned Area Emergency Stabilization Plan

A. FEDERAL, STATE, AND PRIVATE LANDS ENVIRONMENTAL COMPLIANCE RESPONSIBILITIES

All projects proposed in the Wautoma Fire Burned Area Emergency Stabilization (ES) Plan that are prescribed, funded, or implemented by federal agencies on federal, state, or private lands are subject to compliance with the National Environmental Policy Act (NEPA) in accordance with the guidelines provided by Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508); Department of the Interior (DOI) Manual, Part 516, U.S. Fish and Wildlife Service (FWS) NEPA Guidelines, Part 516 DM 6, Appendix 1; and Department of Energy (DOE) NEPA Regulations (10 CFR Part 1021). This Appendix documents the BAER Team considerations of NEPA compliance requirements for prescribed rehabilitation and monitoring actions described in this plan for all jurisdictions affected by the Wautoma Fire burned area emergency stabilization.

B. RELATED PLANS AND CUMULATIVE IMPACTS ANALYSIS

Draft Hanford Reach National Monument Biological Resources Management Plan (DBRMP, FWS 1996), Final Hanford Comprehensive Land-Use Plan and Environmental Impact Statement (CLUP, DOE 1999), and Draft Hanford Reach National Monument Comprehensive Conservation Plan and Environmental Impact Statement (DCCP, FWS 2006): The BAER Team Environmental Protection Specialist reviewed the DBRMP, CLUP and DCCP and determined that actions proposed in the Wautoma Fire BAER Plan within the boundary of the Hanford Reach National Monument are consistent with the management objectives established in those land use plans. The CLUP EIS incorporates the DBRMP by reference, and both specifically address bulldozer lines and provide NEPA compliance for bulldozer line rehabilitation.

Cumulative Impact Analysis: Cumulative effects are the environmental impacts resulting from the incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, both federal and non-federal. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The emergency protection and stabilization treatments for areas affected by the Wautoma Fire, as proposed in the Wautoma Fire ES Plan, do not result in an intensity of impact (i.e., major ground disturbance, etc.) that would cumulatively constitute a significant impact on the quality of the environment. No other actions are proposed or are reasonably foreseeable that would contribute to or enhance impacts related to rehabilitation under this BAER plan. The treatments are consistent with the above jurisdictional management plans and associated

environmental compliance documents and categorical exclusions listed below.

C. APPLICABLE AND RELEVANT CATEGORICAL EXCLUSIONS

U.S. Fish and Wildlife Service: The individual actions proposed in this plan for the Hanford Reach National Monument are categorically excluded from further environmental analysis as provided for in the DOI Manual Part 516 and FWS NEPA Guidelines, Part 516 DM 6, Appendix 1. All applicable and relevant Department and Agency categorical exclusions are listed below. Department exceptions—(516) DM 2.3—do not apply to any of the individual actions proposed. Categorical exclusion decisions are being made with consideration given to the results of required emergency consultations completed by the BAER Team and documented in Section E below.

Applicable Department of the Interior Categorical Exclusions

516 DM2 App. 2, 1.6	Non-destructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research and monitoring activities.
516 DM 6 App. 4.4 A	Operations, maintenance, and replacement of existing facilities (includes road maintenance).
516 DM 6 App. 4.4 L(5)	Emergency road repairs under 23 U.S.C. 125.
516 DM 6 App. 7.4 C(3)	Routine maintenance and repairs to non-historic structures, facilities, utilities, grounds and trails.
516 DM 6 App. 7.4 C(19)	Landscaping and landscape maintenance in previously disturbed or developed areas.

Applicable U.S. Fish and Wildlife Service Categorical Exclusions

516 DM 6 App. 1.4B (1)	Research, inventory, and information collection activities directly related to the conservation of fish and wildlife resources which involve negligible animal mortality of habitat destruction, no introduction of contaminants, or no introduction of organisms not indigenous to the affected ecosystem.
516 DM 6 App. 1.4B (3) i	The installation of fences.
516 DM 6 App. 1.4B (3)iii	The planting of seeds or seedlings and other minor revegetation actions.
516 DM 6 App. 1.4B (3)v	The development of limited access for routine maintenance and management purposes.
516 DM 6 App. 1.4B (5)	Fire management activities, including prevention and restoration measures, when conducted in accordance with Departmental and Service procedures.
516 DM 6 App. 1.4B (6).	The reintroduction or supplementation (e.g. stocking) of native, formerly native, or established species into suitable habitat within their historic or established range, where no or negligible environmental

disturbances are anticipated.

D. STATEMENT OF COMPLIANCE FOR THE WAUTOMA FIRE BURNED AREA EMERGENCY STABILIZATION PLAN

This section documents consideration given to the requirements of specific environmental laws in the development of the Wautoma Fire BAER ES Plan. Specific consultations (if required) initiated or planned to be completed during development and implementations of this plan are also documented. The following executive orders and legislative acts have been reviewed as they apply to the Wautoma Fire BAER ES Plan:

1) **National Historic Preservation Act (NHPA).** Upon approval of the BAER ES Plan by the USFW, the necessary consultations with the Washington State Historic Preservation Office (SHPO) and the Yakama, Umatilla, Nez Perce, and Wanapum Tribes regarding treatments proposed in the Wautoma Fire BAER ES Plan will be performed.

2) **Executive Order 11988 - Floodplain Management.** No treatments are proposed within the 100-year floodplain.

3) **Executive Order 11990 - Protection of Wetlands.** Treatments and actions proposed within wetland areas will “minimize the destruction, loss or degradation of wetlands, and preserve and enhance the natural and beneficial values of wetlands.”

4) **Executive Order 12372 - Intergovernmental Review.).** Upon approval of the BAER ES Plan by the USFW, the necessary coordination and consultation with affected tribes, federal, state and local agencies will be performed. A copy of the final BAER ES Plan will be disseminated to all affected agencies.

5) **Executive Order 12892 - Federal Actions to Address Environmental Justice in Minority and Low-Income Populations.** All federal actions must address and identify, as appropriate, disproportionally high and adverse human health or low-income populations, and Indian tribes in the United States. The BAER Team Environmental Protection Specialist has determined that the actions proposed in this plan will result in no likely adverse human health or environmental effects for minority or low-income populations and/or Native American tribal members.

6) **Endangered Species Act.** Upon approval of the BAER ES Plan by the USFW, as required, the BAER Team Wildlife Biologist and Vegetation Specialists will consult with the FWS and Washington Department of Fish and Wildlife regarding actions proposed in this plan and its potential effects on federal and state listed species. Individual agencies are responsible for continued consultations during plan implementation.

7) **Secretarial Order 3127.** Although contaminated sites are known to occur on properties owned by the DOE at the Hanford Site, no treatments are proposed that would affect contaminated sites. There are no known contaminated sites on other jurisdictions affected by the Wautoma Fire.

8) **Clean Water Act.** The BAER Team Environmental Protection Specialist has determined that treatments prescribed in the area burned by the Wautoma Fire will have no impacts to water quality within wetland areas or other water bodies. The wetland areas within the fire perimeter are associated with the discharge of surface springs. Treatments proposed in this plan would be expected to have a beneficial impact to water quality through stabilization of ash and soils and treatment of invasive species in the riparian zones within the area burned by the Wautoma Fire.

9) **Clean Air Act.** Federal Ambient Air Quality Primary and Secondary Standards are established by the U.S. Environmental Protection Agency (EPA, National Ambient Air Quality Standards) (Clean Air Act, 42 U.S.C. 7470, et seq., as amended). The BAER Team Environmental Protection Specialist has determined that treatments prescribed in the area burned by the Wautoma Fire will have short-term minor impacts to air quality that would not differ significantly from routine land use practices for the area. In the long-term, treatments proposed in this plan would be expected to have a beneficial impact to air quality through stabilization of ash and soils within the area burned by the Wautoma Fire.

NEPA Checklist: If any of the following exception applies, the ES Plan cannot be Categorically Excluded and an Environmental Assessment (EA) is required.

(Yes)	(No)	
( )	(X)	Adversely affect public health and/or safety.
( )	(X)	Adversely affect historic or cultural resources, wilderness, wild and scenic rivers aquifers, prime farmlands, wetlands, floodplains, ecologically critical areas, or national natural landmarks.
( )	(X)	Have highly controversial environmental effects.
( )	(X)	Have highly uncertain environmental effects or involve unique or unknown environmental risks.
( )	(X)	Establish a precedent resulting in significant environmental effects.
( )	(X)	Relates to other actions with individually insignificant but cumulatively significant environmental effects.
( )	(X)	Adversely effects properties listed or eligible for listing in the National Register of Historic Places
( )	(X)	Adversely affect a species listed, or proposed to be listed, as “threatened” or “endangered.”
( )	(X)	Threaten to violate any laws or requirements imposed for the "protection of the environment," such as Executive Order 11988 (Floodplain Management) or Executive Order 11990 (Protection of Wetlands).

National Historic Preservation Act
Ground Disturbance:

( )	None
( )	Ground disturbance did occur and an archeologist survey, required under section 110 of the NHPA has been prepared. Findings have been documented in Appendix I- Cultural Resources Assessment.
(X)	To be determined upon approval of ES Plan by USFW.

A NHPA Clearance Form:

( )	Is required because the project may have affected a site that is eligible or on the National Register of Historic Places. The clearance form will be attached. The SHPO has been consulted under Section 106 (see Cultural Resource Assessment, Appendix I).
( )	Is not required because the ES Plan has no potential to adversely affect cultural resources (initial of Cultural Resource Specialist).
(X)	To be determined upon approval of ES Plan by USFW.

Other Requirements:

(Yes)	(No)	
(X)	( )	Does the ES Plan have potential to affect any Native American uses? If so, consultation with affiliated tribes is needed.
(X)	( )	Are any toxic chemicals, including pesticides or treated wood, proposed for use? If so, local agency integrated pest management specialists must be consulted.

I have reviewed the recommended actions in the Wautoma Fire Burned Area Emergency Stabilization Plan in accordance with the criteria above and have determined that the proposed actions would not involve any significant environmental effects. Therefore, this plan is categorically excluded from further environmental (NEPA) review and documentation. Upon approval of the ES Plan by the USFW, ES Team technical specialists will initiate requisite coordination and consultation to insure compliance with the National Historic Preservation Act, Endangered Species Act, Clean Water Act, Clean Air Act, and other federal, state and local environment review requirements.

Robert Krueger Date
ES Team Environmental Protection Specialist

Gregory M. Hughes, Project Leader Date
Mid-Columbia River National Wildlife Refuge Complex,
Hanford Reach National Monument

APPENDIX V - SUPPORT DOCUMENTS

- Cost/Risk Analysis
- Native-Non-native worksheet
- Section 7 Species List
- Washington State Species List

Cost/Risk Analysis

Part 1. Treatment Cost

Treatments	Cost
1. Determine whether known historic properties may be at risk of further degradation.	47,838.60
2. Non-native invasive species control- Integrated Pest Management.	593,097.00
3. Ecological Stabilization- Native Seeding.	8,704,453.00
4. Emergency Stabilization Plan Development	90,000.00
5. Stream Channel Stabilization/Rock Dams	135,690.00
6. Stream Channel Stabilization/Log Dams	86,745.00
7. Protective Fence/Elk	227,171.00
8. Drift Fence	137,495.00
9. Erosion Control Jute Mating/Dust Control	459,330.00
10. Native Seeding ATV/Floodplain Areas	106,815.00
Total Cost	10,588,634.00

Part 2. Probability of Rehabilitation Treatments Successfully Meeting EFR Objectives

Treatments	Units	%
1. Determine whether known historic properties may be at risk of further degradation.	123 sites	100
2. Non-native invasive species control- Integrated Pest Management.	22,763 acres	75
3. Ecological Stabilization- Native Seeding.	23,649 acres	75
4. Emergency Stabilization Plan Development	1 each	100
5. Stream Channel Stabilization/Rock Dams	4 miles	75
6. Stream Channel Stabilization/Log Dams	1.7 miles	75
7. Protective Fence/Elk	3.5 miles	75
8. Drift Fence	975 rolls	75
9. Erosion Control Jute Mating/Dust Control	9 miles	75
10. Native Seeding ATV/Floodplain Areas	50 acres	75

Risk of Resource Value Loss or Damage

Identify the risk (high, medium, low, none or not applicable (NA) of unacceptable impacts or loss of resources.

No Action- Treatments Not Implemented (check one)

Resource Value	None	Low	Mid	High
Lives		X		
Residential & Commercial Property		X		
Wildlife populations and Listed Species				X
Sensitive Plant Communities and rare plants				X
Ecological Stability				X
Site Productivity				X
Weed Invasion				X
Cultural Resources			X	

Proposed Action - Treatments Successfully Implemented (check one)

Resource Value	None	Low	Mid	High
Lives	X			
Residential & Commercial Property	X			
Wildlife populations and Listed Species		X		
Sensitive Plant Communities and rare plants		X		
Ecological Stability	X			
Site Productivity	X			
Weed Invasion	X			
Cultural Resources	X			

Part 3. SUMMARY

The costs of the project and probability of success of the proposed treatments are compared with the risks to resource values if: 1) no action is taken, and 2) the proposed action is successfully implemented. Alternatives may be included in this analysis to assist in the selection of the treatments that will cost effectively achieve the EFR objectives. Answer the following questions to determine which proposed EFR treatments should be selected and implemented.

1. Are the risks to natural resources and private property **acceptable** as a result of the fire if the following actions are taken?

Proposed Action Yes | ___| No |_X_| Rationale for answer:

Non-native invasive species control- Integrated Pest Management and Re-vegetation Invasive species control. The detection, control and monitoring of non-native invasive species in burned areas and the prevention of the expansion of known populations into newly disturbed areas will present no risk to cultural resources and will prevent the spread of nonnative invasive species to private property.

Ecological Stabilization- Native Seeding. Stabilization of erosion prone soil will prevent traffic hazard along Highway 240 and county roads. Stabilization of soils will prevent erosion, dust storms, from delivering soils to private lands areas and will prevent health hazards (breathing difficulties or allergy symptoms) for local residents. This process will also help maintain site productivity and buffer sensitive plant communities to invasion of non-native species.

Protective Fencing Replacement and Public Safety, Warning Signs. The repair of existing fence to direct the public use and access and to exclude livestock from burned area is necessary until native vegetation can be reestablished, and for protection of Monument resources. Grazing was prohibited on the Monument through Presidential proclamation. Fence and signs will direct the public and reduce trespass into sensitive areas. Further, this will benefit cultural resources as fence will reduce trespass and reduce looting.

Effectiveness Monitoring. Documentation of the success of treatments is important in order to justify the costs associated with large projects that require public funds. It would be irresponsible to expend public funds without documenting the effectiveness and value of the stabilization treatments.

No Action Yes |__| No |_X_| Rationale for answer:

No the risks to cultural resources and private property are not acceptable. Non-native invasive plants and unacceptable soil erosion could significantly impact the Monument's resources and will likely affect private property. Ecological function will be reduced and sensitive plant communities and wildlife will be impacted. Cultural resources will incur additional damage if fences are not repaired. The public trust will be violated because

the long-term management of this area was entrusted to the Department of Interior. Permanent site degradation will reduce the areas ability to support priority public uses.

Alternative(s) Yes |__| No |__| Rationale for answer: NONE

2. Is the probability of success of the proposed action, alternatives or no action acceptable given their costs?

Proposed Action Yes |_X_| No |__| Rationale for answer:

The actions have been rated as having a high probability of success. Previous efforts to conduct similar post-fire stabilization on the Hanford Reach National Monument have been highly successful. The proposed treatments will not only protect public safety and private property by controlling erosion and weed spread, but will also protect site productivity, ecological function and cultural resources. Protection of sensitive shrub-steppe habitat and obligate wildlife species will not only benefit these resources but will improve their condition as re-growth occurs.

No Action Yes |__| No |_X_| Rationale for answer:

Failure to protect and stabilize this area would impact nationally significant resources and create a public safety hazard. Failure to stabilize highly mobile and erosion prone soils will cause wind borne dust storms to reduce visibility along major traffic routes and increase the health hazard due to breathing difficulties or allergies of local residents. Failure to prevent the spread of non-native plants will increase the long term costs of managing these lands, increase fire risks, reduce critical habitat for many wildlife species, and reduce potential management of listed species and reintroduction sites for listed species.

Alternative(s) Yes |__| No |__| Rationale for answer: None.

3. Which approach will most cost-effectively and successfully attain the EFR objectives and therefore is recommended for implementation from a Cost/Risk Analysis standpoint?

Proposed Action |___|, Alternative(s) |__|, or No Action |__|

Exhibit 6-1 NATIVE/NON-NATIVE PLANT WORKSHEET

The Native Seed Mix listed below has been requested by Heidi Newsome of the USFWS for use on the Wautoma Fire ES Plan on September 6, 2007 and is included in Part F this ES Plan.

Mix 1: 3,537 acres aerial application (1,435 ac. in Milepost 17; 2,102 ac. in Wautoma); 5,107 acres drill seed application (452 ac. in MP17; 4,655 ac. in Wautoma)

Grasses	
Indian Ricegrass (*Oryzopsis hymenoides*) (Nez Par)	3 lbs./ac. PLS
Needle and thread grass (*Stipa comata*)	0.2 lbs/acre
Sandberg's bluegrass (*Poa sandbergii*) (Hanford)	4 lbs./ac. PLS
Sand dropseed *(Sporobolous cryptandrus)*	0.2 lb. /ac PLS
Bottlebrush Squirreltail (*Elymus elymoides*)	4 lbs./ac PLS
Thickspike Wheatgrass (Swinderar) *(Elymus lanceolatus)*	4 lbs./ac PLS

Forbs	
Yarrow, (*Achillea millefolium*)	0.2 lbs./ac PLS
Columbia Blue Flax (*Linum* sp.)	0.2 lbs./ac PLS

Mix 2: 16,242 acres aerial application (2,822 ac. in MP17; 13,420 ac. in Wautoma); 1,272 acres drill seed application (all in Wautoma)

Grasses	
Indian Ricegrass (*Oryzopsis hymenoides*) (Nez Par)	3 lbs./ac. PLS
Needle and thread grass (*Stipa comata*)	0.2 lbs/acre
Sandberg's bluegrass (*Poa sandbergii*) (Hanford)	2 lbs./ac. PLS
Sand dropseed *(Sporobolous cryptandrus)*	0.2 lb. /ac PLS
Bottlebrush squirreltail (*Elymus elymoides*)	1.5 lbs./ac PLS
Bluebunch wheatgrass (*Pseudoroegneria spicata)*	4 lbs./ac PLS

Forbs	
Yarrow, (*Achillea millefolium*)	0.2 lbs./ac PLS
Columbia Blue Flax (*Linum* sp.)	0.2 lbs./ac PLS

Shrubs	
Wyoming Big Sagebrush (*Artemisia tridentate* ssp. *wyomingensis*)	0.1 lbs/ac PLS
Winterfat (*Krascheninnikovia lanata*)	0.1 lbs/ac PLS
Antelope bitterbrush (*Purshia tridentata*)	0.1 lbs/ac PLS

Mix 3: Riparian areas: 50 acres (all Wautoma)

Seed Mix 2 plus:
Great Basin Wild Ryegrass seed (*Elymus cinereus*) 4 lbs/acre
PLS

BENTON COUNTY
Updated 8/8/2007

LISTED

Endangered

Pygmy rabbit (*Brachylagus idahoensis*) – Columbia Basin distinct population segment

Threatened

Bull trout *(Salvelinus confluentus)* – Columbia River distinct population segment
Spiranthes diluvialis (Ute ladies'-tresses), plant

CANDIDATE

Yellow-billed cuckoo (*Coccyzus americanus*)
Eriogonum codium (Umtanum desert buckwheat), plant

SPECIES OF CONCERN

Animals

Bald eagle *(Haliaeetus leucocephalus)* (delisted, monitor status)
Burrowing owl *(Athene cunicularia)*
California floater *(Anodonta californiensis)*, mussel
Columbia clubtail *(Gomphus lynnae)*, dragonfly
Ferruginous hawk *(Buteo regalis)*
Giant Columbia spire snail *(Fluminicola columbiana)*
Loggerhead shrike *(Lanius ludovicianus)*
Long-eared myotis (*Myotis evotis*)
Margined sculpin *(Cottus marginatus)*
Pacific lamprey *(Lampetra tridentata)*
Pallid Townsend's big-eared bat *(Corynorhinus townsendii pallescens)*
Redband trout (*Oncorhynchus mykiss*)
River lamprey *(Lampetra ayresi)*
Sagebrush lizard *(Sceloporus graciosus)*
Townsend's ground squirrel (*Spermophilus townsendii)*
Western brook lamprey (*Lampetra richardsoni*)

Vascular Plants

Astragalus columbianus (Columbia milk-vetch)
Cryptantha leucophaea (Gray cryptantha)
Haplopappus liatriformis (Palouse goldenweed)
Lomatium tuberosum (Hoover's desert-parsley)
Mimulus jungermannioides (Liverwort monkey-flower)
Rorippa columbiae (Persistent sepal yellowcress)

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

Species of Concern

State Species of Concern

Include those species listed as State Endangered, State Threatened, State Sensitive, or State Candidate, as well as species listed or proposed for listing by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service.

Search Species Lists

SORT RESULTS BY:

- (•) Common Name
- ( ) Scientific Name
- ( ) Animal Type

Search Listings

Advanced Search

Species of Concern Lists

- Endangered Species
- Threatened Species
- Sensitive Species
- State Candidate Species

- Complete SOC List
- Main SOC Page

Status Codes:

FE: Federal Endangered
FT: Federal Threatened
FC: Federal Candidate
FCo: Federal Species of Concern
SE: State Endangered
ST: State Threatened
SC: State Candidate
SS: State Sensitive

Mapping Criteria Codes:

(listed in order of decreasing specificity)
B: Breeding Location (Nest or Den)
CR: Communal Roost
RC,RLC,RSC: Regular (Large or Small) Concentration
RI: Regular Individual
IO: Individual Occurrence
(If a less specific criterion is listed, then the more specific criteria are implied as well)

Related Links

- State Monitor Species

Species of Concern in Washington State

Current through June 13, 2007

COMMON NAME	SCIENTIFIC NAME	ANIMAL TYPE	FEDERAL STATUS	STATE STATUS	MAPPING CRITERIA
WESTERN TOAD	*BUFO BOREAS*	Amphibian	FCo	SC	IO
NORTHERN LEOPARD FROG	*RANA PIPIENS*	Amphibian	FCo	SE	IO
OREGON SPOTTED FROG	*RANA PRETIOSA*	Amphibian	FC	SE	IO
COLUMBIA SPOTTED FROG	*RANA LUTEIVENTRIS*	Amphibian	none	SC	IO
CASCADE TORRENT SALAMANDER	*RHYACOTRITON CASCADAE*	Amphibian	none	SC	IO
DUNN'S SALAMANDER	*PLETHODON DUNNI*	Amphibian	none	SC	IO
LARCH MOUNTAIN SALAMANDER	*PLETHODON LARSELLI*	Amphibian	FCo	SS	IO
VAN DYKE'S SALAMANDER	*PLETHODON VANDYKEI*	Amphibian	FCo	SC	IO
ROCKY MOUNTAIN TAILED FROG	*ASCAPHUS MONTANUS*	Amphibian	none	SC	IO
COMMON LOON	*GAVIA IMMER*	Bird	none	SS	B
WESTERN GREBE	*AECHMOPHORUS OCCIDENTALIS*	Bird	none	SC	B
SHORT-TAILED ALBATROSS	*PHOEBASTRIA ALBATRUS*	Bird	FE	SC	IO
AMERICAN WHITE PELICAN	*PELECANUS ERYTHRORHYNCHOS*	Bird	none	SE	B,RSC
BROWN PELICAN	*PELECANUS OCCIDENTALIS*	Bird	FE	SE	RSC
BRANDT'S CORMORANT	*PHALACROCORAX PENICILLATUS*	Bird	none	SC	B
GOLDEN EAGLE	*AQUILA CHRYSAETOS*	Bird	none	SC	B
BALD EAGLE	*HALIAEETUS LEUCOCEPHALUS*	Bird	FT	ST	B,RSC,CR
NORTHERN GOSHAWK	*ACCIPITER GENTILIS*	Bird	FCo	SC	B
FERRUGINOUS HAWK	*BUTEO REGALIS*	Bird	FCo	ST	B
MERLIN	*FALCO COLUMBARIUS*	Bird	none	SC	B
PEREGRINE FALCON	*FALCO PEREGRINUS*	Bird	FCo	SS	B,RI
AMERICAN PEREGRINE FALCON	*FALCO PEREGRINUS ANATUM*	Bird	FCo	SS	B,RI
ARCTIC PEREGRINE FALCON	*FALCO PEREGRINUS TUNDRIUS*	Bird	FCo	SS	RI
PEALE'S PEREGRINE FALCON	*FALCO PEREGRINUS PEALEI*	Bird	FCo	SS	B,RI
SHARP-TAILED GROUSE	*TYMPANUCHUS PHASIANELLUS*	Bird	FCo	ST	B,RSC
SAGE GROUSE	*CENTROCERCUS UROPHASIANUS*	Bird	FC	ST	B,RSC
SANDHILL CRANE	*GRUS CANADENSIS*	Bird	none	SE	B,RLC
SNOWY PLOVER	*CHARADRIUS ALEXANDRINUS*	Bird	FT	SE	B
UPLAND SANDPIPER	*BARTRAMIA LONGICAUDA*	Bird	none	SE	B,RI
COMMON MURRE	*URIA AALGE*	Bird	none	SC	B,RC
MARBLED MURRELET	*BRACHYRAMPHUS MARMORATUS*	Bird	FT	ST	B
CASSIN'S AUKLET	*PTYCHORAMPHUS ALEUTICUS*	Bird	FCo	SC	B
TUFTED PUFFIN	*FRATERCULA CIRRHATA*	Bird	FCo	SC	RLC
YELLOW-BILLED CUCKOO	*COCCYZUS AMERICANUS*	Bird	FC	SC	B,RI
BURROWING OWL	*ATHENE CUNICULARIA*	Bird	FCo	SC	B
FLAMMULATED OWL	*OTUS FLAMMEOLUS*	Bird	none	SC	B,RI
SPOTTED OWL	*STRIX OCCIDENTALIS*	Bird	FT	SE	IO
VAUX'S SWIFT	*CHAETURA VAUXI*	Bird	none	SC	B,CR
LEWIS' WOODPECKER	*MELANERPES LEWIS*	Bird	none	SC	B
PILEATED WOODPECKER	*DRYOCOPUS PILEATUS*	Bird	none	SC	B
WHITE-HEADED WOODPECKER	*PICOIDES ALBOLARVATUS*	Bird	none	SC	B,RI
BLACK-BACKED WOODPECKER	*PICOIDES ARCTICUS*	Bird	none	SC	B,RI
PURPLE MARTIN	*PROGNE SUBIS*	Bird	none	SC	B
SLENDER-BILLED WHITE-BREASTED NUTHATCH	*SITTA CAROLINENSIS ACULEATA*	Bird	FCo	SC	IO
LOGGERHEAD SHRIKE	*LANIUS LUDOVICIANUS*	Bird	FCo	SC	B
OREGON VESPER SPARROW	*POOECETES GRAMINEUS AFFINIS*	Bird	FCo	SC	B
SAGE SPARROW	*AMPHISPIZA BELLI*	Bird	none	SC	B

SAGE THRASHER	*OREOSCOPTES MONTANUS*	Bird	none	SC	B
STREAKED HORNED LARK	*EREMOPHILA ALPESTRIS STRIGATA*	Bird	FC	SE	B
ISLAND MARBLE	*EUCHLOE AUSONIDES INSULANUS*	Butterfly/Moth	FCo	SC	IO
MAKAH (QUEEN CHARLOTTE) COPPER	*LYCAENA MARIPOSA CHARLOTTENSIS*	Butterfly/Moth	FCo	SC	IO
PUGET BLUE	*PLEBEJUS ICARIOIDES BLACKMOREI*	Butterfly/Moth	none	SC	IO
VALLEY SILVERSPOT	*SPEYERIA ZERENE BREMNERII*	Butterfly/Moth	FCo	SC	IO
GREAT ARCTIC	*OENEIS NEVADENSIS GIGAS*	Butterfly/Moth	none	SC	IO
OREGON SILVERSPOT BUTTERFLY	*SPEYERIA ZERENE HIPPOLYTA*	Butterfly/Moth	FT	SE	IO
MARDON SKIPPER	*POLITES MARDON*	Butterfly/Moth	FC	SE	IO
SHEPARD'S PARNASSIAN	*PARNASSIUS CLODIUS SHEPARDI*	Butterfly/Moth	none	SC	IO
SILVER-BORDERED FRITILLARY	*BOLORIA SELENE ATROCOSTALIS*	Butterfly/Moth	none	SC	IO
JOHNSON'S HAIRSTREAK	*MITOURA JOHNSONI*	Butterfly/Moth	none	SC	IO
JUNIPER HAIRSTREAK	*MITOURA GRYNEA BARRYI*	Butterfly/Moth	none	SC	IO
CHINQUAPIN HAIRSTREAK	*HABRODAIS GRUNUS HERRI*	Butterfly/Moth	none	SC	IO
YUMA SKIPPER	*OCHLODES YUMA*	Butterfly/Moth	none	SC	IO
TAYLOR'S CHECKERSPOT	*EUPHYDRYAS EDITHA TAYLORI*	Butterfly/Moth	FC	SE	IO
SAND-VERBENA MOTH	*COPABLEPHARON FUSCUM*	Butterfly/Moth	none	SC	IO
RIVER LAMPREY	*LAMPETRA AYRESI*	Fish	FCo	SC	IO
PACIFIC HERRING (CHERRY POINT)	*CLUPEA PALLASI*	Fish	FC	SC	IO
PACIFIC HERRING (DISCOVERY BAY)	*CLUPEA PALLASI*	Fish	FC	SC	IO
CHUM SALMON (HOOD CANAL SU)	*ONCORHYNCHUS KETA*	Fish	FT	SC	none
CHUM SALMON (LOWER COLUMBIA)	*ONCORHYNCHUS KETA*	Fish	FT	SC	none
COHO SALMON (LOWER COLUMBIA/SW WA)	*ONCORHYNCHUS KISUTCH*	Fish	FC	none	none
SOCKEYE SALMON (SNAKE R.)	*ONCORHYNCHUS NERKA*	Fish	FE	SC	none
SOCKEYE SALMON (OZETTE LAKE)	*ONCORHYNCHUS NERKA*	Fish	FT	SC	none
CHINOOK SALMON (PUGET SOUND)	*ONCORHYNCHUS TSHAWYTSCHA*	Fish	FT	SC	none
CHINOOK SALMON (UPPER COLUMBIA SP)	*ONCORHYNCHUS TSHAWYTSCHA*	Fish	FE	SC	none
CHINOOK SALMON (LOWER COLUMBIA)	*ONCORHYNCHUS TSHAWYTSCHA*	Fish	FT	SC	none
CHINOOK SALMON (SNAKE R. SP/SU)	*ONCORHYNCHUS TSHAWYTSCHA*	Fish	FT	SC	none
CHINOOK SALMON (SNAKE R. FALL)	*ONCORHYNCHUS TSHAWYTSCHA*	Fish	FT	SC	none
STEELHEAD (SNAKE RIVER)	*ONCORHYNCHUS MYKISS*	Fish	FT	SC	none
STEELHEAD (MIDDLE COLUMBIA)	*ONCORHYNCHUS MYKISS*	Fish	FT	SC	none
STEELHEAD (UPPER COLUMBIA)	*ONCORHYNCHUS MYKISS*	Fish	FT	SC	none
STEELHEAD (PUGET SOUND)	*ONCORHYNCHUS MYKISS*	Fish	FT	.	none
STEELHEAD (LOWER COLUMBIA)	*ONCORHYNCHUS MYKISS*	Fish	FT	SC	none
BULL TROUT	*SALVELINUS CONFLUENTUS*	Fish	FT	SC	none
BULL TROUT (COLUMBIA BASIN)	*SALVELINUS CONFLUENTUS*	Fish	FT	SC	none
BULL TROUT (COASTAL/PUGET SOUND)	*SALVELINUS CONFLUENTUS*	Fish	FT	SC	none
EULACHON	*THALEICHTHYS PACIFICUS*	Fish	none	SC	RC
OLYMPIC MUDMINNOW	*NOVUMBRA HUBBSI*	Fish	none	SS	IO
PYGMY WHITEFISH	*PROSOPIUM COULTERI*	Fish	FCo	SS	IO
LAKE CHUB	*COUESIUS PLUMBEUS*	Fish	none	SC	IO
LEOPARD DACE	*RHINICHTHYS FALCATUS*	Fish	none	SC	IO
UMATILLA DACE	*RHINICHTHYS UMATILLA*	Fish	none	SC	IO
MOUNTAIN SUCKER	*CATOSTOMUS PLATYRHYNCHUS*	Fish	none	SC	IO
PACIFIC COD (S&C PUGET SOUND)	*GADUS MACROCEPHALUS*	Fish	FCo	SC	IO
PACIFIC HAKE (C. PUGET SOUND)	*MERLUCCIUS PRODUCTUS*	Fish	FCo	SC	IO
WALLEYE POLLOCK (SO. PUGET SOUND)	*THERAGRA CHALCOGRAMMA*	Fish	FCo	SC	IO
BROWN ROCKFISH	*SEBASTES AURICULATUS*	Fish	FCo	SC	IO
COPPER ROCKFISH	*SEBASTES CAURINUS*	Fish	FCo	SC	IO

GREENSTRIPED ROCKFISH	*SEBASTES ELONGATUS*	Fish	none	SC	IO
WIDOW ROCKFISH	*SEBASTES ENTOMELAS*	Fish	none	SC	IO
YELLOWTAIL ROCKFISH	*SEBASTES FLAVIDUS*	Fish	none	SC	IO
QUILLBACK ROCKFISH	*SEBASTES MALIGER*	Fish	FCo	SC	IO
BLACK ROCKFISH	*SEBASTES MELANOPS*	Fish	none	SC	IO
CHINA ROCKFISH	*SEBASTES NEBULOSUS*	Fish	none	SC	IO
TIGER ROCKFISH	*SEBASTES NIGROCINCTUS*	Fish	none	SC	IO
BOCACCIO ROCKFISH	*SEBASTES PAUCISPINIS*	Fish	none	SC	IO
CANARY ROCKFISH	*SEBASTES PINNIGER*	Fish	none	SC	IO
REDSTRIPE ROCKFISH	*SEBASTES PRORIGER*	Fish	none	SC	IO
YELLOWEYE ROCKFISH	*SEBASTES RUBERRIMUS*	Fish	none	SC	IO
MARGINED SCULPIN	*COTTUS MARGINATUS*	Fish	FCo	SS	IO
MERRIAM'S SHREW	*SOREX MERRIAMI*	Mammal	none	SC	IO
KEEN'S MYOTIS	*MYOTIS KEENII*	Mammal	none	SC	B,IO
TOWNSEND'S BIG-EARED BAT	*CORYNORHINUS TOWNSENDII*	Mammal	FCo	SC	B,CR
PACIFIC TOWNSEND'S BIG-EARED BAT	*CORYNORHINUS TOWNSENDII TOWNSENDII*	Mammal	FCo	SC	B,CR
PALLID TOWNSEND'S BIG-EARED BAT	*CORYNORHINUS TOWNSENDII PALLESCENS*	Mammal	FCo	SC	B,CR
PYGMY RABBIT	*BRACHYLAGUS IDAHOENSIS*	Mammal	FE	SE	IO
WHITE-TAILED JACKRABBIT	*LEPUS TOWNSENDII*	Mammal	none	SC	IO
BLACK-TAILED JACKRABBIT	*LEPUS CALIFORNICUS*	Mammal	none	SC	IO
WESTERN GRAY SQUIRREL	*SCIURUS GRISEUS*	Mammal	FCo	ST	IO
WASHINGTON GROUND SQUIRREL	*SPERMOPHILUS WASHINGTONI*	Mammal	FC	SC	IO
TOWNSEND'S GROUND SQUIRREL	*SPERMOPHILUS TOWNSENDII TOWNSENDII*	Mammal	none	SC	IO
MAZAMA (WESTERN) POCKET GOPHER	*THOMOMYS MAZAMA*	Mammal	FC	ST	IO
SHELTON POCKET GOPHER	*THOMOMYS MAZAMA COUCHI*	Mammal	FC	ST	IO
OREGON POCKET GOPHER	*THOMOMYS MAZAMA OREGONUS*	Mammal	none	ST	IO
CATHLAMET POCKET GOPHER	*THOMOMYS MAZAMA LOUIEI*	Mammal	FC	ST	IO
OLYMPIC POCKET GOPHER	*THOMOMYS MAZAMA MELANOPS*	Mammal	FC	ST	IO
YELM POCKET GOPHER	*THOMOMYS MAZAMA YELMENSIS*	Mammal	FC	ST	IO
GRAY-TAILED VOLE	*MICROTUS CANICAUDUS*	Mammal	none	SC	IO
GRAY WOLF	*CANIS LUPUS*	Mammal	FE	SE	IO
GRIZZLY BEAR	*URSUS ARCTOS*	Mammal	FT	SE	IO
FISHER	*MARTES PENNANTI*	Mammal	FC	SE	IO
WOLVERINE	*GULO GULO*	Mammal	FCo	SC	IO
SEA OTTER	*ENHYDRA LUTRIS*	Mammal	FCo	SE	B,RI,RSC
SEA OTTER	*ENHYDRA LUTRIS LUTRIS*	Mammal	none	SE	B,RI,RSC
LYNX	*LYNX CANADENSIS*	Mammal	FT	ST	IO
GRAY WHALE	*ESCHRICHTIUS ROBUSTUS*	Mammal	none	SS	IO
SEI WHALE	*BALAENOPTERA BOREALIS*	Mammal	FE	SE	IO
FIN WHALE	*BALAENOPTERA PHYSALUS*	Mammal	FE	SE	IO
BLUE WHALE	*BALAENOPTERA MUSCULUS*	Mammal	FE	SE	IO
HUMPBACK WHALE	*MEGAPTERA NOVAEANGLIAE*	Mammal	FE	SE	IO
BLACK RIGHT WHALE	*BALAENA GLACIALIS*	Mammal	FE	SE	IO
KILLER WHALE	*ORCINUS ORCA*	Mammal	FE	SE	IO
PACIFIC HARBOR PORPOISE	*PHOCOENA PHOCOENA*	Mammal	none	SC	RSC
SPERM WHALE	*PHYSETER MACROCEPHALUS*	Mammal	FE	SE	IO
COLUMBIAN WHITE-TAILED DEER	*ODOCOILEUS VIRGINIANUS LEUCURUS*	Mammal	FE	SE	IO
WOODLAND CARIBOU	*RANGIFER TARANDUS*	Mammal	FE	SE	IO
STELLER SEA LION	*EUMETOPIAS JUBATUS*	Mammal	FT	ST	RSC
PINTO ABALONE	*HALIOTIS KAMTSCHATKANA*	Mollusk	FCo	SC	IO
OLYMPIA OYSTER	*OSTREA LURIDA*	Mollusk	none	SC	IO
GIANT COLUMBIA RIVER LIMPET	*FISHEROLA NUTTALLI*	Mollusk	none	SC	IO
GREAT COLUMBIA SPIRE SNAIL	*FLUMINICOLA COLUMBIANA*	Mollusk	FCo	SC	IO
BLUE-GRAY TAILDROPPER	*PROPHYSAON COERULEUM*	Mollusk	none	SC	IO
COLUMBIA OREGONIAN	*CRYPTOMASTIX HENDERSONI*	Mollusk	none	SC	IO
POPLAR OREGONIAN	*CRYPTOMASTIX POPULI*	Mollusk	none	SC	IO

DALLES SIDEBAND	*MONADENIA FIDELIS MINOR*	Mollusk	none	SC	IO
NEWCOMB'S LITTORINE SNAIL	*ALGAMORDA SUBROTUNDATA*	Mollusk	FCo	SC	IO
CALIFORNIA FLOATER	*ANODONTA CALIFORNIENSIS*	Mollusk	FCo	SC	IO
COLUMBIA CLUBTAIL	*GOMPHUS LYNNAE*	Other Insect	FCo	SC	IO
COLUMBIA RIVER TIGER BEETLE	*CICINDELA COLUMBICA*	Other Insect	none	SC	IO
BOG IDOL LEAF BEETLE	*DONACIA IDOLA*	Other Insect	none	SC	IO
HATCH'S CLICK BEETLE	*EANUS HATCHI*	Other Insect	FCo	SC	IO
BELLER'S GROUND BEETLE	*AGONUM BELLERI*	Other Insect	FCo	SC	IO
MANN'S MOLLUSK-EATING GROUND BEETLE	*SCAPHINOTUS MANNII*	Other Insect	none	SC	IO
WESTERN POND TURTLE	*CLEMMYS MARMORATA*	Reptile	FCo	SE	IO
LEATHERBACK SEA TURTLE	*DERMOCHELYS CORIACEA*	Reptile	FE	SE	IO
GREEN SEA TURTLE	*CHELONIA MYDAS*	Reptile	FT	ST	IO
SAGEBRUSH LIZARD	*SCELOPORUS GRACIOSUS*	Reptile	FCo	SC	IO
LOGGERHEAD SEA TURTLE	*CARETTA CARETTA*	Reptile	FT	ST	IO
SHARPTAIL SNAKE	*CONTIA TENUIS*	Reptile	FCo	SC	IO
STRIPED WHIPSNAKE	*MASTICOPHIS TAENIATUS*	Reptile	none	SC	IO
CALIFORNIA MOUNTAIN KINGSNAKE	*LAMPROPELTIS ZONATA*	Reptile	none	SC	IO
